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ROYAL ONTARIO MUSEUM
OF
MINERALOGY

ANNUAL REPORT

OF THE

MINISTER OF MINES

FOR THE

YEAR ENDING 31st DECEMBER,

1912,

BEING AN ACCOUNT OF

MINING OPERATIONS FOR GOLD, COAL, ETC.,

IN THE

PROVINCE OF BRITISH COLUMBIA.



THE GOVERNMENT OF
THE PROVINCE OF BRITISH COLUMBIA.

PRINTED BY
AUTHORITY OF THE LEGISLATIVE ASSEMBLY.

VICTORIA, B.C.:

Printed by WILLIAM H. CULLIS, Printer to the King's Most Excellent Majesty.

1913.

2

C.

ANNUAL REPORT

OF THE

MINISTER OF MINES.

1912.

To His Honour THOMAS W. PATERSON,

Lieutenant-Governor of the Province of British Columbia.

MAY IT PLEASE YOUR HONOUR:

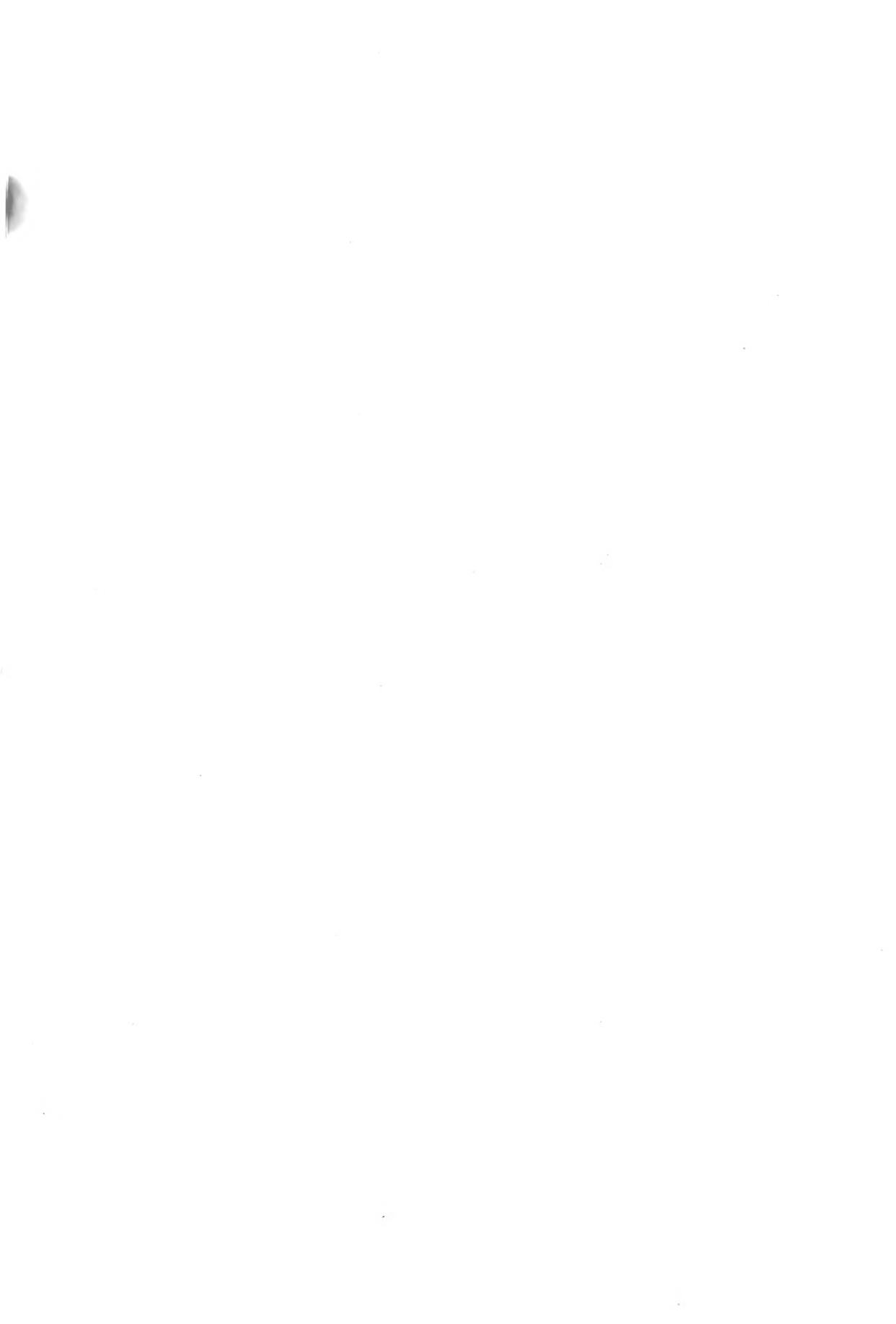
The Annual Report of the Provincial Mineralogist upon the Mining Industry of the Province for the year 1912 is herewith respectfully submitted.

RICHARD McBRIDE,

Minister of Mines.

Minister of Mines' Office,

April 21st, 1913.





U. S. BUREAU OF MINES

Pass between Headwaters of Spatsizi and Skeena Rivers.



REPORT OF THE BUREAU OF MINES

— BY —

WILLIAM FLEET ROBERTSON, PROVINCIAL MINERALOGIST.

—:o:—

*To the Honourable Sir Richard McBride, K.C.M.G.,
Minister of Mines.*

SIR,—I have the honour to submit herewith my Annual Report on the Mining Industry of the Province for the year ending December 31st, 1912.

The statistical tables give the total mineral output of the Province to date, and show in considerable detail the actual mineral production of the past year, as based on smelter or mill returns; also, a summary of the production of each of the last four years, thus illustrating by comparison the progress made in productive mining during this period.

To facilitate comparison with information previously given, I have retained, as closely as was possible, the general form already established for such tables and for the Report.

I have the honour to be,

Sir,

Your obedient servant,

WILLIAM FLEET ROBERTSON,

Provincial Mineralogist.

*Bureau of Mines, Victoria, B.C.,
April 21st, 1913.*



MINERAL PRODUCTION OF BRITISH COLUMBIA.

METHOD OF COMPUTING PRODUCTION.

In assembling the output of the lode mines in the following tables, the established custom of this Bureau has been adhered to, viz.: The output of a mine for the year is considered that amount of ore for which the smelter or mill returns have been received during the year. This system does not give the exact amount mined during the year, but rather the amount credited to the mine on the company's books during such year.

For ore shipped in December the smelter returns are not likely to be received until February in the new year, or later, and have, consequently, to be carried over to the credit of such new year. This plan, however, will be found very approximate for each year, and ultimately correct, as ore not credited in one year is credited in the next.

In the lode mines tables, the amount of the shipments has been obtained from certified returns received from the various mines, as provided for in the "Inspection of Metalliferous Mines Act, 1897." In calculating the value of the products, the average prices for the year in the New York Metal Market have been used as a basis. For silver 95 per cent., for lead 90 per cent., and for zinc 85 per cent. of such market prices have been taken. Treatment and other charges have not been deducted, except that in copper the amount of metal actually recovered has been taken, thus covering loss in slags.

TABLE I.—TOTAL PRODUCTION FOR ALL YEARS UP TO AND INCLUDING 1912.

Gold, placer	\$ 72,194,603
Gold, lode	70,859,022
Silver	33,863,940
Lead	27,520,753
Copper	73,723,562
Coal and coke	132,871,155
Building-stone, bricks, etc.	17,576,084
Other metals, zinc, etc.	1,528,403
Total	\$430,137,522

TABLE II.—PRODUCTION FOR EACH YEAR FROM 1852 TO 1912 (INCLUSIVE).

1852 to 1892 (inclusive)	\$ 81,090,069
1893	3,588,413
1894	4,225,717
1895	5,643,042
1896	7,507,956
1897	10,455,268
1898	10,906,861
1899	12,393,131
1900	16,344,751
1901	20,086,780
1902	17,486,550
1903	17,495,954
1904	18,977,359
1905	22,461,325
1906	24,980,546
1907	25,882,560
1908	23,851,277
1909	24,443,025
1910	26,377,066
1911	23,499,672
1912	32,440,800
Total	\$430,137,522

Table III. gives a statement in detail of the quantities and value of the different mineral products for the years 1910, 1911, and 1912. It has been impossible as yet to collect complete statistics regarding building-stone, lime, bricks, tiles, and other miscellaneous products, but such figures as it has been possible to secure are given in some detail in Table V.

TABLE III.

QUANTITIES AND VALUE OF MINERAL PRODUCTS FOR 1910, 1911, AND 1912.

	Customary Measure.	1910.		1911.		1912.	
		Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
Gold, placer.....	Ounces.....		\$ 540,000		\$ 426,000		\$ 555,500
" lode.....	"	267,701	5,533,380	228,617	4,725,513	257,496	5,322,442
Silver.....	"	2,450,241	1,245,016	1,892,361	958,293	3,132,108	1,810,945
Lead.....	Pounds.....	34,658,716	1,386,350	26,872,397	1,069,521	44,871,454	1,805,627
Copper.....	"	38,213,931	4,871,512	36,927,656	4,571,644	51,456,537	8,408,513
Zinc.....	"	4,184,192	192,473	2,634,544	129,092	5,358,280	316,159
Coal.....	Tons, 2,240 lb.	2,800,046	9,800,161	2,193,062	7,675,717	2,628,804	9,200,814
Coke.....	" "	218,029	1,308,174	66,005	396,030	264,333	1,585,998
Miscellaneous products			1,500,000		3,547,262		3,435,722
			\$26,377,066		\$23,499,072		\$32,440,800

TABLE IV.

OUTPUT OF MINERAL PRODUCTS BY DISTRICTS AND DIVISIONS.

NAMES.	DIVISIONS.			DISTRICTS.		
	1910.	1911.	1912.	1910.	1911.	1912.
CARIBOO DISTRICT.....				\$ 239,000	\$ 180,000	\$ 268,000
Cariboo Mining Division.....	\$ 218,000	\$ 136,000	\$ 180,000			
Quesnel ".....	6,000	34,000	80,000			
Omineca ".....	15,000	10,000	8,000			
CASSIAR DISTRICT.....				283,807	293,442	467,579
EAST KOOTENAY DISTRICT.....				6,121,832	2,475,056	5,723,004
WEST KOOTENAY DISTRICT.....				5,088,186	4,343,912	6,165,255
Ainsworth Division.....	318,058	75,768	371,760			
Slocan and Slocan City ".....	845,106	798,989	1,951,315			
Nelson ".....	876,002	509,265	581,700			
Trail Creek ".....	2,966,096	2,891,866	3,214,751			
Other parts.....	82,924	68,024	45,729			
BOUNDARY DISTRICT.....				6,998,519	5,621,109	8,716,406
Osoyoos, Grand Forks & Greenwood Divisions.....	6,442,063	4,763,817	7,903,006			
Similkameen, Nicola, Vernon.....	556,456	814,386	748,900			
Yale, Ashcroft, Kamloops.....		42,906	64,500			
LILLOEET DISTRICT.....				9,832	6,467	5,000
COAST DISTRICTS (Nanaimo, Alberni, Clayoquot, Quatsino, Victoria, Vancouver).....				7,635,890	10,579,086	11,095,556
				\$26,377,066	\$23,499,072	\$32,440,800

TABLE V.
MISCELLANEOUS PRODUCTS AND TOTALS OF PRODUCTION, 1912.

DISTRICT AND DIVISION.	DETAILS OF MISCELLANEOUS PRODUCTS.										SUMMARY OF TOTALS OF PRODUCTION.				
	Cement.	Lime and Limestone.	Building-stone.	Riprap.	Crushed Rock.	Sand and Gravel.	Pottery and Tile.	Red Brick.	Fire, Face, Silica Brick.	Clay, Gypsum, etc.	Total Miscellaneous Products.	Total Output of Collieries.	Total of Metallic Mines.	Totals for Divisions.	Totals for Districts.
CARBON															
Cariboo													180,000	180,000	268,060
Quebec					30,000								50,000	80,000	
Omineca													8,000	8,000	
CASSIAR													290,000	290,000	467,579
Atlin															
Liard Strike															
Skeena, Portland Canal			25,000	50,000	10,000	60,000							32,579	177,579	
Queen Charlotte															
EAST KOOTENAY															
Fort Steele			10,000	10,000		10,000									
Windermere-Golden			10,000	10,000											
WEST KOOTENAY															
Ainsworth															
Slocan and Slocan City															
Nelson		5,000	15,000												
Trail Creek		10,000			3,000			264							
Other Divisions			5,000					5,000	714						
YALE															
Grand Forks															
Greenwood		10,000	5,000	15,000		10,000	5,000	10,000		1,426			7,846,580	7,963,606	
Osoyoos															
Similkameen															
Nicola				10,000		10,000		5,000							
Vernon															
Yale			5,000	10,000		30,000							2,000	61,500	
Ashcroft															
Kamloops															
Lillooet	800,000	151,250	600,000	95,000	275,000	382,310	200,000	305,000	175,142	27,116	3,010,818	5,453,840	2,630,898	11,695,556	5,000
COAST DISTRICT	800,000	176,250	675,000	200,000	315,000	505,310	205,000	351,500	175,406	29,256	3,435,722	10,786,812	18,218,266	32,440,800	32,440,800

TABLE VI.—PLACER GOLD.

Table VI. contains the yearly production of placer gold to date, as determined by the returns, sent in by the banks and express companies, of gold transmitted by them to the mints, and from returns sent in by the Gold Commissioners and Mining Recorders. To these yearly amounts one-third was added up to the year 1878; from then to 1895 and from 1898 to 1909, one-fifth; and since then one-tenth, which proportions are considered to represent, approximately the amount of gold sold of which there is no record. This placer gold contains from 10 to 25 per cent. silver, but the silver value has not been separated from the totals, as it would be insignificant.

YIELD OF PLACER GOLD PER YEAR TO DATE.

1858.....	\$ 705,000	1872.....	\$ 1,610,972	1886.....	\$ 903,651	1900.....	\$ 1,278,724
1859.....	1,615,070	1873.....	1,305,749	1887.....	693,709	1901.....	970,100
1860.....	2,228,543	1874.....	1,844,618	1888.....	616,731	1902.....	1,073,140
1861.....	2,666,118	1875.....	2,474,004	1889.....	588,923	1903.....	1,060,420
1862.....	2,656,903	1876.....	1,786,648	1890.....	490,435	1904.....	1,115,300
1863.....	3,913,563	1877.....	1,608,182	1891.....	429,811	1905.....	969,300
1864.....	3,735,850	1878.....	1,275,204	1892.....	399,526	1906.....	948,400
1865.....	3,491,205	1879.....	1,290,058	1893.....	356,131	1907.....	828,000
1866.....	2,662,106	1880.....	1,013,827	1894.....	405,516	1908.....	647,000
1867.....	2,480,868	1881.....	1,046,737	1895.....	481,683	1909.....	477,000
1868.....	3,372,972	1882.....	954,085	1896.....	544,026	1910.....	540,000
1869.....	1,774,978	1883.....	794,252	1897.....	513,520	1911.....	426,000
1870.....	1,336,936	1884.....	736,165	1898.....	643,346	1912.....	555,500
1871.....	1,799,440	1885.....	713,738	1899.....	1,344,900		
Total.....						\$72,194,603	

TABLE VII.—PRODUCTION OF LORE MINES.*

YEAR.	GOLD.		SILVER.		LEAD.		COPPER.		TOTAL VALUE
	Oz.	Value.	Oz.	Value.	Pounds.	Value.	Pounds.	Value.	
1887.....			17,690	\$ 17,331	204,800	\$ 9,216			\$ 26,547
1888.....			79,780	75,000	674,500	29,813			104,813
1889.....			53,192	47,873	165,100	6,498			54,371
1890.....			70,427	73,948	Nil.	Nil.			73,948
1891.....			4,500	4,000	Nil.	Nil.			4,000
1892.....			77,160	66,935	808,420	33,064			99,999
1893.....	1,170	\$ 23,404	227,000	195,000	2,135,023	78,996			297,400
1894.....	6,252	125,014	746,379	470,219	5,662,523	169,875	324,680	\$ 16,234	781,342
1895.....	39,264	785,271	1,496,522	977,229	16,475,464	532,255	952,840	47,642	2,342,397
1896.....	62,259	1,244,180	3,135,343	2,100,689	24,199,977	721,384	3,818,556	190,926	4,257,179
1897.....	106,141	2,122,820	5,472,971	3,272,836	38,841,135	1,390,517	5,325,180	266,258	7,052,431
1898.....	110,061	2,201,217	4,292,401	2,375,841	31,693,559	1,077,581	7,271,678	874,781	6,529,420
1899.....	138,315	2,857,573	2,939,413	1,663,708	21,862,436	878,870	7,722,591	1,351,453	6,751,694
1900.....	167,153	3,453,381	3,958,175	2,309,200	63,358,621	2,691,887	9,997,080	1,615,289	10,069,757
1901.....	210,381	4,348,603	5,151,333	2,884,745	51,582,906	2,002,733	27,603,746	4,446,963	13,683,044
1902.....	236,491	4,888,269	3,917,917	1,941,328	22,536,381	824,832	29,636,057	3,446,673	11,101,102
1903.....	232,831	4,812,616	2,996,204	1,521,472	18,089,283	689,744	34,359,921	4,547,535	11,571,367
1904.....	222,042	4,589,608	3,222,481	1,719,516	36,646,244	1,421,874	35,710,128	4,578,037	12,309,035
1905.....	238,660	4,933,102	3,439,417	1,971,818	56,580,703	2,399,022	37,692,251	5,876,222	15,180,164
1906.....	224,027	4,630,639	2,990,262	1,897,320	52,408,217	2,667,578	42,990,488	8,288,565	17,484,102
1907.....	196,179	4,055,020	2,745,448	1,703,825	47,738,703	2,291,458	40,832,720	8,166,544	16,216,847
1908.....	255,582	5,282,880	2,631,389	1,321,483	43,195,733	1,632,799	47,274,614	6,240,249	14,477,411
1909.....	238,224	4,924,090	2,532,742	1,239,270	44,396,346	1,709,259	45,597,245	5,918,522	13,791,141
1910.....	267,701	5,333,380	2,450,241	1,245,016	34,658,746	1,386,350	38,243,934	4,871,512	13,036,258
1911.....	228,617	4,725,513	1,892,364	958,293	26,872,397	1,069,521	36,927,656	4,571,644	11,324,971
1912.....	257,496	5,322,442	3,132,108	1,810,945	44,871,454	1,805,627	51,456,537	8,408,513	17,346,627
To 1.....	3,438,849	70,859,022	59,672,859	33,863,940	685,658,671	27,520,753	503,737,902	73,723,562	205,967,277

* In addition to the above, there was mined in 1910 zinc-ore containing some 4,184,192 lb. of zinc, valued at \$192,473—which makes the total production of lode mines for 1910 \$13,228,731. In 1911 there was mined zinc-ore containing 2,634,544 lb. of zinc, valued at \$129,092—making the total production of lode mines for 1911 \$14,454,063. In 1912 there was marketed zinc-ore containing 5,358,280 lb. of metallic zinc, valued at \$316,139—making the total production of lode mines for 1912 \$17,662,766, and the total to date \$296,604,981.

TABLE VIII.—COAL AND COKE PRODUCTION PER YEAR TO DATE.

COAL.		
YEAR.	TONS (2,240 lb).	VALUE.
1836-77	965,808	\$ 3,278,948
1878	170,846	512,538
1879	241,301	723,903
1880	267,595	802,785
1881	228,357	685,071
1882	282,139	846,417
1883	213,299	639,897
1884	394,070	1,182,210
1885	265,596	796,788
1886	326,636	979,908
1887	413,360	1,240,080
1888	489,301	1,467,903
1889	579,830	1,739,490
1890	678,140	2,034,420
1891	1,029,097	3,087,291
1892	826,335	2,479,005
1893	978,294	2,934,882
1894	1,012,953	3,038,859
1895	939,654	2,818,962
1896	896,222	2,688,666
1897	882,854	2,648,562
1898	1,135,865	3,407,595
1899	1,306,324	3,918,972
1900	1,439,595	4,318,785
1901	1,460,331	4,380,993
1902	1,397,394	4,192,182
1903	1,168,194	3,504,582
1904	1,253,628	3,760,884
1905	1,384,312	4,152,936
1906	1,517,303	4,551,909
1907	1,800,067	6,300,235
1908	1,677,849	5,872,472
1909	2,006,476	7,022,666
1910	2,800,046	9,800,161
1911	2,193,062	7,675,717
1912	2,628,804	9,200,814
Total	37,250,937 tons.	\$118,687,488
COKE.		
1895-97	19,396	\$ 96,980
1898 (estimated)	35,000	175,000
1899	34,251	171,255
1900	85,149	425,745
1901	127,081	635,405
1902	128,015	640,075
1903	165,543	827,715
1904	238,428	1,192,140
1905	271,785	1,358,925
1906	199,227	996,135
1907	222,913	1,337,478
1908	247,399	1,484,394
1909	258,703	1,552,218
1910	218,029	1,308,174
1911	66,005	396,030
1912	264,333	1,585,998
Total	2,581,247 tons.	\$14,183,667

TABLE IX.—PRODUCTION IN DETAIL OF THE

DISTRICT.	YEAR	TONS.	GOLD—PLACER.		GOLD—LODE.		SILVER.	
			Ounces.	Value.	Ounces.	Value.	Ounces.	Value.
				\$		\$		\$
Cariboo								
Cariboo Division	1909		11,000	220,000				
	1910		10,000	218,000				
	1911		6,800	136,000				
	1912		9,000	180,000				
Quesnel	1909		600	12,000				
	1910		300	6,000				
	1911		1,700	34,000				
	1912		2,500	50,000				
Omineca	1909		750	15,000				
	1910		750	15,000				
	1911		500	10,000				
	1912		400	8,000				
Cassiar								
Atlin Division	1909	0	10,000	200,000			353	175
	1910		13,750	275,000				
	1911	38	11,250	225,000	3	62	2,653	1,343
	1912		14,500	290,000				
Liard, Stikine, Skeena, Queen Charlotte, Portland Canal Divisions.	1909	4,200	450	9,000	261	5,395	4,216	2,062
	1910	4	400	8,000			1,454	730
	1911	7,061	300	6,000	500	10,335	27,323	13,836
	1912	3,249	450	9,000	197	4,072	5,868	3,391
East Kootenay								
Fort Steele Division	1909	149,680	150	3,000			583,240	289,911
	1910	115,762	150	3,000			501,475	254,809
	1911	39,543	150	3,000			330,235	167,231
	1912	29,910	100	2,000			376,918	217,821
Windermere Golden	1909	20					820	404
	1910	53					243	124
	1911							
	1912	20,400					7,405	4,279
West Kootenay								
Ainsworth Division	1909	97,608			162	3,340	352,555	172,505
	1910	21,850			71	1,468	233,010	118,397
	1911	671			4	88	77,375	39,183
	1912	32,741			80	1,653	301,755	174,334
Slocan and Slocan City	1909	28,306			95	1,964	788,175	361,180
	1910	44,468			161	2,988	964,634	490,150
	1911	45,466			47	971	794,926	402,044
	1912	103,423			198	4,052	1,657,105	957,641
Nelson Division	1909	36,814	50	1,000	21,204	432,834	75,908	37,142
	1910	36,203	100	2,000	36,834	761,359	45,787	23,265
	1911	39,736	50	1,000	17,640	364,619	76,774	38,878
	1912	52,323	50	1,000	17,513	361,994	164,162	84,881
Trail Creek Division	1909	257,956			115,153	2,380,213	80,026	39,157
	1910	253,471			119,277	2,465,455	87,233	44,639
	1911	254,062			116,682	2,411,837	88,056	44,692
	1912	243,870			132,073	2,729,949	87,530	50,594
Revelstoke, Trout Lake and Lardican	1909	1,770	100	2,000	732	15,139	169,435	82,994
	1910	971	50	1,000	418	8,640	107,753	54,782
	1911	740	100	2,000	57	1,178	67,884	34,376
	1912	451	225	4,500	89	1,840	43,536	25,159
Boundary								
(Grand Forks, Greenwood and Osoyoos Divisions.)	1909	1,461,533	50	1,000	93,229	1,927,043	492,333	240,898
	1910	1,701,113	50	1,000	105,294	2,176,427	466,943	234,215
	1911	1,244,819	50	1,000	87,745	1,813,630	326,849	165,517
	1912	1,989,034	50	1,000	104,849	2,167,225	369,341	225,000
Similkameen, Nicola, and Vernon Divisions	1909		50	1,000				
	1910		50	1,000				
	1911		50	1,000				
	1912		100	2,000				
Yale, Ashcroft and Kamloops Divisions	1909		160	2,000				
	1910	12	100	2,000			3	1
	1911	4,257	50	1,000	52	1,075	743	174
	1912		100	2,000				
Lillooet								
Lillooet and Clinton Divisions	1909	436	500	10,000	323	6,676		
	1910	443	550	7,000	137	2,832		
	1911	84	250	5,000	71	1,467		
	1912		250	5,000				
Coast								
(Nanaimo, Alberni, Clayoquot, Quatsino, New Westminster, Vancouver, and Victoria Divisions.)	1909	39,557	50	1,000	6,370	131,461	38,676	18,924
	1910	42,080	50	1,000	5,563	115,111	47,164	23,934
	1911	143,252	50	1,000	5,815	120,196	100,926	51,192
	1912	212,675	50	1,000	2,437	51,613	93,468	56,505
TOTALS	1909	2,051,713	23,870	477,000	238,224	4,924,090	2,532,742	1,239,270
	1910	2,216,428	27,000	540,000	267,701	5,533,380	2,450,241	1,245,016
	1911	1,770,758	21,300	426,000	228,617	4,725,513	1,892,394	958,293
	1912	2,683,632	27,775	555,500	259,498	5,322,442	3,132,103	1,810,045

TABLE X—Showing Mineral Production of British Columbia.

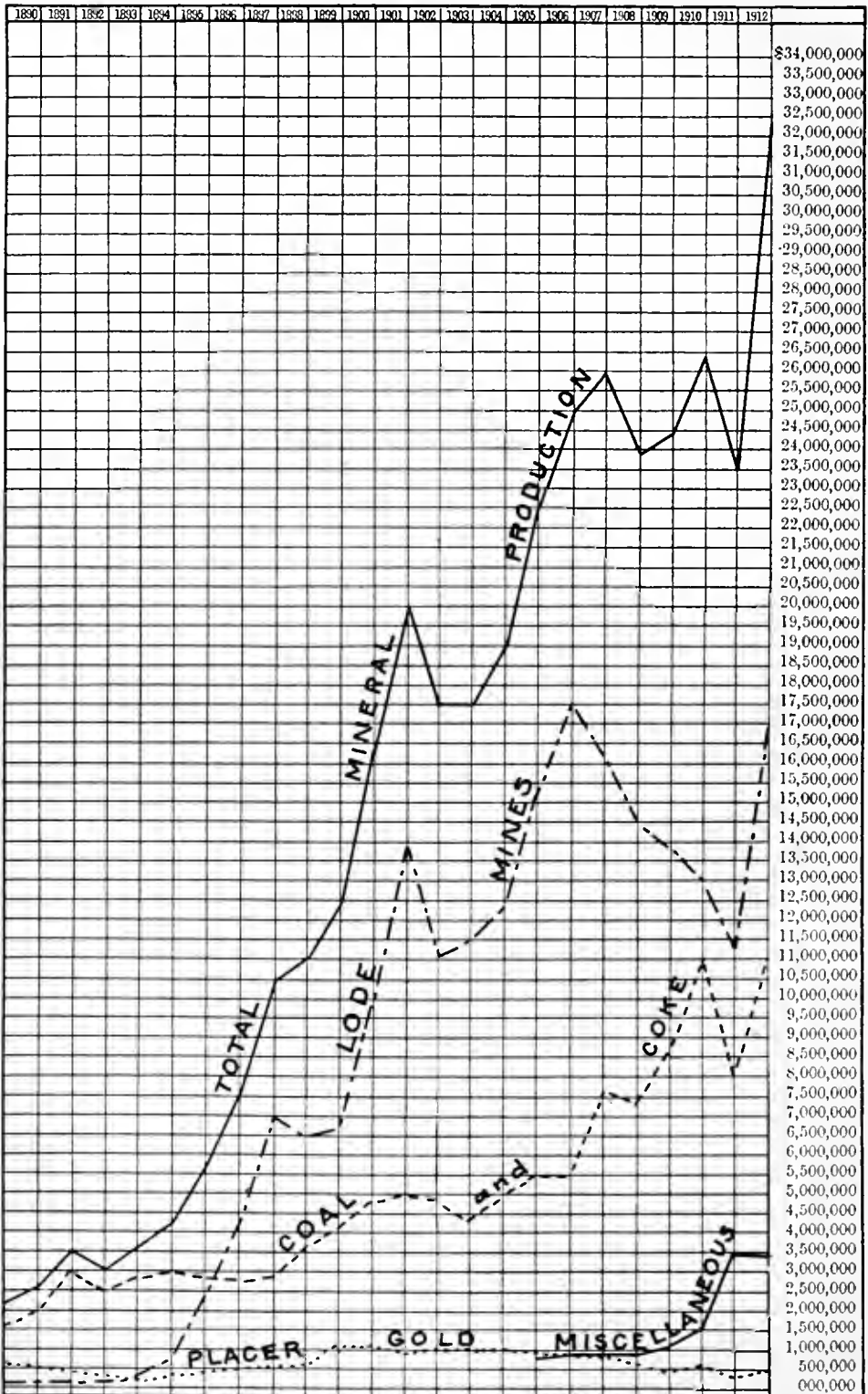
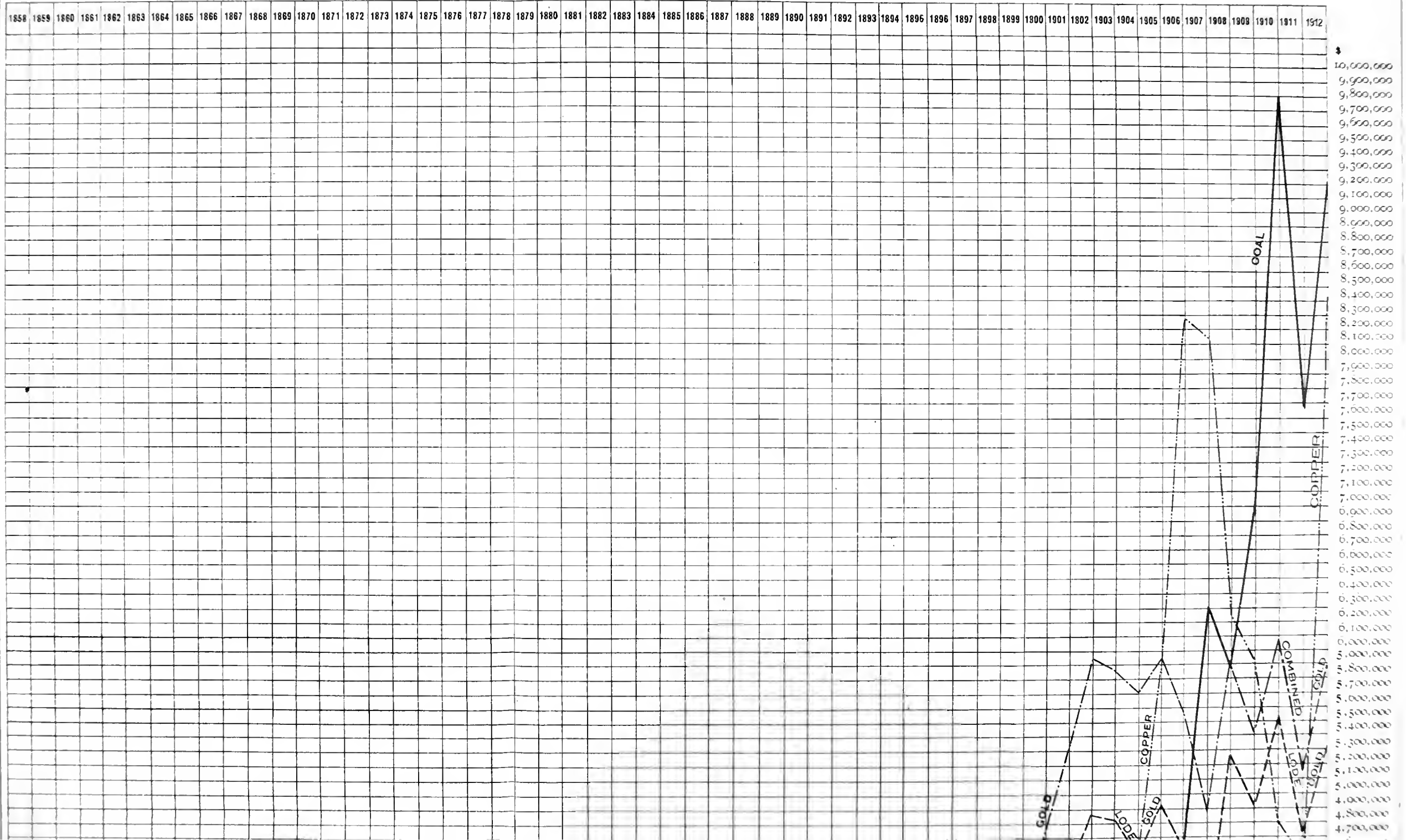


TABLE
 SHOWING MINERAL PRODUCTION
 OF
 BRITISH COLUMBIA



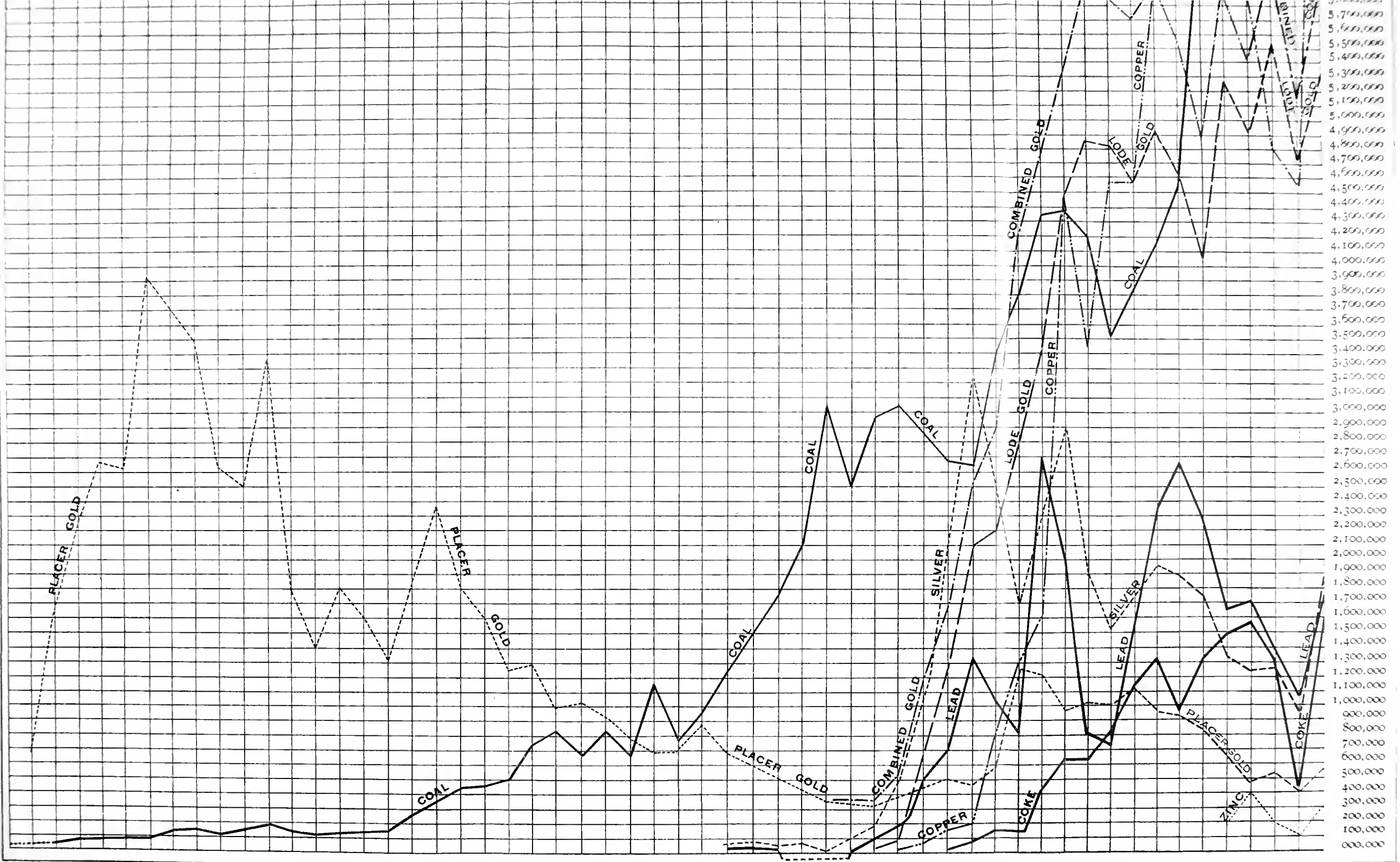


TABLE XI.

Showing Comparative Production in 1912 of Certain Minerals by British Columbia and Other Provinces of Dominion.

YUKON TERRITORY.	Gold	\$5,510,000	Silver†.....	\$36,953	Coal.....	\$3,610
	Aggregate of Provinces.	BRITISH COLUMBIA.	ALL OTHER PROVINCES COMBINED.			
Gold	\$7,729,995	\$5,377,912	\$1,352,053			
Silver†	13,691,315	1,310,015	16,381,300			
Copper	12,361,237	3,103,513	4,152,724			
Lead†	1,305,627	1,305,627	NIL			
Iron	332,391	NIL	332,391			
Coal.....	37,062,160	9,200,314	26,275,313			
Coke.....		1,555,988				
Total.....	\$73,936,255	\$23,633,939	\$50,297,316			

* Taken from "Preliminary Report on the Mineral Production of Canada in 1912," corrected by final figures of British Columbia Statistics.

† At the British Columbia valuation.

PROGRESS OF MINING.

The year 1912 has proved exceedingly favourable to mining in the Province, and the mineral production made therein has been the greatest in the history of its mining.

The gross value of the mineral production for 1912 was \$32,440,800, an increase over that of the year 1911 of \$8,941,728, or about 33.3 per cent.

The greatest output formerly made was in 1910, amounting to \$26,377,066, which is exceeded by the production of 1912 by \$6,063,731, or 23 per cent., thus showing by comparison, even with what had been the "record year," how much the mineral production has increased during the past year.

The gradual increase in production during the past twenty-three years, and its fluctuations, are graphically shown in Table X. on page fourteen of this Report.

The tonnage of ore mined in the lode mines of the Province during the year 1912 was also greater than ever before, amounting to 2,688,532 tons, exceeding the greatest tonnage formerly mined in any year—1910—by 472,104 tons, equivalent to 21.3 per cent. increase.

As compared with the year 1911, the tonnage mined this year shows an increase of 917,777 tons, or about 52 per cent.

The tonnage mined in 1912 was produced by the various districts in about the following proportions: Boundary, 74.00 per cent.; Rossland, 9.07 per cent.; The Coast District, 8.03 per cent.; Slocan District, 5.07 per cent.; Nelson, 1.94 per cent.; East Kootenay, 1.87 per cent.; and all other parts of Province combined, 0.02 per cent.

The following table shows the number of mines which shipped ore during the year 1912, the districts in which they are situated, and the tonnage produced in each district, together with the number of men employed, both above ground and underground:—

TABLE SHOWING DISTRIBUTION OF SHIPPING MINES IN 1912.

	Tons of Ore shipped.	No. of Mines shipping.	No. of Mines shipping over 100 Tons in 1912.	MEN EMPLOYED IN THESE MINES.		
				Below.	Above.	Total.
CASSIAR:						
Atlin, Skeena, Queen Charlotte, and Portland Canal.....	3,249	2	2	25	18	43
EAST KOOTENAY:						
Fort Steele.....	29,910	3	3	103	28	131
Windermere-Golden.....	20,400	1	1	14	15	29
WEST KOOTENAY:						
Ainsworth.....	32,741	8	5	105	59	164
Slocan and Slocan City.....	103,629	26	11	303	162	465
Nelson.....	52,323	15	11	186	108	294
Trail Creek.....	243,870	9	5	529	173	702
Other Divisions.....	451	8	1	21	10	31
BOUNDARY:						
Grand Forks, Greenwood, and Osoyoos.....	1,989,084	11	9	635	210	845
Ashcroft-Kamloops.....						
Similkameen-Vernon.....						
LILLOUET						
COAST	212,875	3	3	252	446	698
Total.....	2,688,532	86	51	2,173	1,229	3,402

In explanation of the table it should be said that, in its preparation, a mine employing twelve men for four months is credited in the table with four men for twelve months, so that the total given is less than the actual number of individuals who worked in the mines during the year.

TABLE SHOWING NON-SHIPPING MINES AND MEN EMPLOYED.

DISTRICT.	NUMBER OF MINES.			MEN EMPLOYED.		
	Working.	Idle.	Total.	Below.	Above.	Total.
COAST AND CASSIAR.....	5	6	11	64	47	111
EAST KOOTENAY.....	2	.....	2	5	11	16
AINSWORTH.....	8	8	16	55	20	75
SLOCAN.....	18	11	29	96	18	114
NELSON.....	8	3	11	39	16	55
TRAIL CREEK.....	.....	4	4	.....	.....	.....
LARDEAU.....	.....	1	1	.....	.....	.....
BOUNDARY.....	2	18	20	30	17	47
LILLOOET.....	2	.....	2	11	6	17
Total.....	45	51	96	300	135	435

STATISTICAL TABLES.

Referring to the preceding tables of the mineral production of the Province, the following is a summary of their contents:—

TABLE I. shows the total gross value of each mineral product mined in the Province up to the end of 1912, aggregating \$430,137,522. From this table it will be seen that coal-mining has produced more than any other separate class of mining, a total of \$132,871,155; followed next in importance this year by copper at \$73,723,562, thus relegating to third place placer gold at \$72,194,603, and lode gold at \$70,859,022 to fourth place.

The metal gold, obtained from both placer and lode mining, amounts to a value of \$143,053,625, the greatest amount derived from any one mineral, the next important being coal, the total gross value of which, combined with that of coke, is \$132,871,155, followed by copper at \$73,723,562, silver at \$33,863,910, and lead at \$27,520,753.

TABLE II. shows the value of the total production of the mines of the Province for each year from 1893 to 1912 (inclusive), during which period the output has increased about tenfold, and reached a production, for the year 1912, valued at \$32,440,800, which is about three times what it was in 1898. The year 1912 shows a gross production of \$8,941,728 greater than the previous year, and \$6,063,734, or 23 per cent., greater than the year 1910, which had previously been the record year. The value of the total products of the mines of the Province up to the end of 1912 is \$430,137,522.

TABLE III. gives the quantities in the customary units of measure, and the values, of the various metals or minerals which go to make up the total of the mineral production of the Province, and also, for the purposes of comparison, similar data for the two preceding years.

The table shows that there has been this year an increase in the production of placer gold of some \$129,500, and at the same time an increase in the output of lode gold of \$596,929, making a total increase of \$726,429 in the production of the metal.

The amount of silver produced this year was 3,132,108 oz., having a gross value of \$1,810,045, an increase in the number of ounces produced of 1,239,744, due to a greatly increased production in the Slocan, Nelson, and Boundary Districts. The gross value of the silver product this year shows an increase over that of last year of \$851,752, which is partly accounted for by a higher market price of silver during this year.

The table shows an output of lead in 1912 amounting to 44,871,454 lb., valued at \$1,805,627, which is an increase over the production of the preceding year of 17,999,057 lb. of lead.

The production of copper this year was 51,456,537 lb., valued at \$8,408,513, an increase in amount of 14,528,881 lb., or about 39 per cent. The value of the product was greater than that of the preceding year by \$3,836,869—an increase of 82 per cent.

TABLE IV. Shows the proportions of the total mineral productions made in each of the various districts into which the Province is divided.

It will be noted that this year again the Coast District has the honour of first place on the list, followed, in order of importance, by the Boundary and West Kootenay Districts. The Coast and East Kootenay Districts owe a considerable percentage of their output to the coal-mines situated within their limits, whereas, in the other districts, the production is almost entirely from metal-mining.

The Coast District also derives a large proportion of its production from miscellaneous products, such as building materials, and due to the larger cities therein; this year this amounted to \$3,010,818, as shown in Table V.

In this table, this year again, the value of zinc has been distributed to the districts producing it, which has occasioned some changes in this table as compared with the 1909 Report, thus making it differ from the column in a previous report.

TABLE V. is a new table, introduced last year, and is an endeavour to show in some detail the production of those products, such as building materials, previously summarized under miscellaneous products. Much difficulty has been found in obtaining reliable figures regarding these products, and in many cases they have had to be estimated; but while the figures are not as complete as desired, they are at least approximate, and show what an important branch of mineral production this has become.

TABLE VI. gives the statistical record of the placer mines of the Province from 1858 to 1912, and shows a total production of \$72,194,603. The output for 1912 was \$555,500, an increase, as compared with the previous year, of about 30.4 per cent.

TABLE VII. relates entirely to the lode mines of the Province, and shows the quantities and value of the various metals produced each year since the beginning in 1887, of such mining in the Province. The gross value of the product of these mines to date is \$205,967,277, or, including the zinc production of 1910, 1911, and 1912, \$206,604,981. The production of 1912, including zinc, was \$17,662,766, an increase over the previous year of \$6,208,703, or about 51.2 per cent. the reasons for which have already been given.

TABLE VIII. contains the statistics of production of the coal-mines of the Province. The total amount of coal mined to the end of 1912 is 37,250,937 tons (of 2,240 lb.), worth \$118,687,488. Of this, there was produced in 1912 some 2,628,804 tons, valued at \$9,200,814, an increase of 435,742 tons in quantity and of \$1,525,097 in value over the preceding year. In these figures of coal production, the coal used in making coke is not included, as such coal is accounted for in the figures of output of coke. The amount of coal used in making coke in 1912 was 396,905 tons, from which was made 264,333 tons of coke, having a value of \$1,585,998, an increase over the preceding year of 198,328 tons, or about 300 per cent., with

an increase in value of \$1,189,968. While only 261,333 tons of coke was actually made, 267,564 was actually sold; 3,322 tons being taken from the stocks at the mines, and 91 tons was used under the company's boilers. The total value of the output of the collieries of the Province in 1912 was \$10,786,812.

The average selling prices taken this year in the calculation of value of product are the same as those used last year; that for coal being \$3.50 and for coke \$6 per ton of 2,240 lb. The prices used in calculations prior to 1907 were \$3 and \$5 respectively.

More detailed statistics as to the coal production of the Province and of the separate districts are given elsewhere in this Report.

TABLE IX. gives the details of production of the metalliferous mines of the Province for the years 1909, 1910, 1911, and 1912, and the districts in which such productions were made, showing the tonnage of ore mined in each district, with its metallic contents and its market value.

The total tonnage of ore mined in the Province during the year 1912 was 2,688,532 tons, having a gross value of \$18,218,266.

The following table shows the percentages of such tonnage and values derived from the various districts of the Province:—

Boundary District.....	74.00	per cent. of tonnage.
Trail Creek Mining Division.....	9.07	" "
Coast District.....	8.03	" "
Slocan District.....	5.07	" "
Nelson Mining Division.....	1.94	" "
East Kootenay District.....	1.87	" "
Other Divisions.....	.02	" "
	100.00	

In reports previous to 1910 there has been included in this table the "miscellaneous products," and in 1910 these were shown distributed to the various districts; the great increase of these products in the past few years has rendered it advisable that this table be reserved exclusively for metalliferous products, and so a new table (No. V.) has been introduced, giving in some detail the output of the miscellaneous products.

In making comparisons of this table with similar tables in previous reports, the fact that "miscellaneous" has been removed will have to be borne in mind.

TABLE X. presents in graphic form the facts shown in figures in the tables, and demonstrates to the eye the rapid growth of lode-mining in the Province, and also the fluctuations to which it has been subject.

It will be seen that, although coal-mining has been a constantly increasing industry during this whole period of twenty-three years, lode-mining did not begin, practically, until 1894, since when it has risen with remarkable rapidity, though not without interruption, until it reached, in 1906, the \$17,000,000 line, and the total production in 1910 reached the \$26,000,000 line, and this year it has reached the \$32,000,000 line.

TABLE XI. compares graphically the output of certain mineral products in British Columbia with that of the combined output of similar products in all the other Provinces of the Dominion, and shows that in 1912, British Columbia produced, in the minerals shown an amount equal to over 57 per cent. of all the other Canadian Provinces' combined

COAL.

The collieries of the Province made in 1912 a gross production of 3,025,709 tons (2,240 lb.) of coal, an increase over the preceding year of 727,991 tons equivalent to an increase of 31.5 per cent.

While this comparison is true, it must in fairness be stated that the production for 1911 was much below normal, due to the labour troubles in the East Kootenay coalfield, whereby the collieries of that district were closed for the last eight months of the year.

It might be better, therefore, to make comparison with the year 1910, in which the coal production was by far the greatest in the history of coal-mining in the Province, and during which the gross coal production was 3,139,235 tons, or only 113,526 tons greater than this year.

Had it not been for labour troubles in the mines of the Canadian Collieries, on Vancouver Island, during the latter part of 1912, whereby that company's output was reduced to a point 150,000 tons lower than the preceding year, there is little doubt but that 1912 would have been the record year to date, instead of occupying, as it does, only second place; but, with the exception noted, it is greatly in advance of any other year.

The greater part of this production is still mined by three companies—the Crow's Nest Pass Coal Company of East Kootenay, the Canadian Collieries and the Western Fuel Company of Vancouver Island, which mined, collectively, 75 per cent. of the gross output, their respective production representing 31.5 per cent., 24.5 per cent., and 19 per cent. of such total.

Of the other collieries: In the Coast District, on Vancouver Island, the Pacific Coast Coal mines, Limited, produced 151,589 tons, and the Vancouver-Nanaimo Coal Company 88,253 tons; and in the Nicola Valley section of the district, the Nicola Valley Coal and Coke Company mined 142,973 tons, the Inland Coal and Coke Company 31,300 tons, the Princeton Coal and Land Company 28,174 tons, the Diamond Vale Coal Company 3,310 tons, while the United Empire Coal Company made a start, producing some 500 tons of coal.

In the East Kootenay District, in addition to the Crow's Nest Pass Coal Company, which produced 950,706 tons, the Hosmer Mines, Limited, produced 188,243 tons and the Corbin Coal and Coke Company 122,263 tons.

In addition to those companies actually shipping, several other companies have been installing plant and have approached the shipping stage, mention of which will be made elsewhere in this Report.

The collieries of the Coast District, including the Nicola Valley field, are to be credited this year with about 58.3 per cent. of the total coal output.

The gross output of the collieries for the past year was, as already stated, 3,025,709 tons, in addition to which some 17,809 tons of coal was taken from stock, making the gross amount of coal distributed 3,043,518 tons.

Of this gross amount, there was sold for consumption in Canada, 1,263,427 tons; sold for consumption in the United States, 858,981 tons; while 108,157 tons was exported to other countries, making the total coal sales for the year 2,230,565 tons of 2,240 lb.

In addition to the coal sold, there was used in the manufacture of coke 396,905 tons, all in the East Kootenay field; and used under companies' boilers, etc., 240,304 tons; while 175,744 tons was lost in washing and screening.

There was no coke made this year in the Coast District, although some 4,266 tons was sold from stock, the total coke production having been made by the Crow's Nest Pass Coal Company, and Hosmer Mines, Limited, in the East Kootenay field, where, from 396,905 tons of coal, 264,333 tons of coke was manufactured, of which 91 tons was used under the companies' boilers.

The coke sales of the Province for the past year amounted to 267,564 tons, of which 3,322 tons was drawn from stock.

The following table indicates the markets in which the coal and coke output of the Province was sold:—

COAL.	Coast District.	Crowsnest Pass District.	Total for Province.
Sold for consumption in Canada (Tons—2,240 lb.)	1,032,351	231,076	1,263,427
" export to United States "	307,239	551,742	858,981
" export to other countries "	198,157	.....	198,157
Total coal sales	1,447,747	782,818	2,230,565
COKE.			
Sold for consumption in Canada (Tons—2,240 lb.)	4,266	213,041	217,307
" export to United States . . . . . "	.....	50,257	50,257
" export to other countries . . . . . "	.....	.....	.....
Total coke sales	4,266	263,298	267,564

COLLIERIES OF COAST DISTRICT.

The Coast collieries mined 1,764,497 tons of coal in 1912, to which was added 16,894 tons taken from stock, making 1,781,391 tons distributed from these collieries in 1912. This amount was distributed thus:—

Sold as coal in Canada	1,032,351 tons.
" United States	307,239 "
" other countries	198,157 "
Total sold as coal	1,447,747 tons.
Used under companies' boilers, etc	157,900 "
Used in making coke "
Lost in washing	175,744 "
	1,781,391
<i>Minus</i> coal taken from stock	16,894 "
Gross output	1,764,497 "

The total coal sales of the Coast collieries for the year show, as compared with the sales of the previous year, a decrease of 233,695 tons, equivalent to 13.9 per cent.

The consumption of coal in that part of British Columbia served by the Coast collieries—partly due to the introduction of California oil-fuel—shows this year a decrease of 246,289 tons, or about 19 per cent. from the preceding year; the amount exported to the United States was 56,755 tons less, but the amount exported to other countries was increased by 69,349 tons.

Only one company in the Coast District—the Canadian Collieries, Limited—has ever made coke, and this year the ovens have not been in operation, although the company sold 4,266 tons of coke from stock, and still has 2,370 tons in stock.

The coke sold was entirely for consumption in British Columbia, no export sales having been made.

On Vancouver Island, four companies produced coal this year—the Canadian Collieries, Limited, the Western Fuel Company, the Pacific Coast Coal Mines, and the Vancouver-Nanaimo Coal Company; the majority of these companies each operate two, or more, collieries. The combined output of the Island collieries was 1,558,240 tons.

In the Nicola and Princeton valleys of the Coast District, the Nicola Valley Coal and Coke Company produced 112,973 tons of coal; the Princeton Colliery, 28,174 tons; the Inland Coal and Coke Syndicate (formerly Coal Hill Syndicate), 31,300 tons; the Diamond Vale Colliery, 3,310 tons; and the United Empire, 500 tons.

The total output of this portion of the district was 206,257 tons. The Pacific Coast Colliery Company of Nicola, and the Columbia Coal and Coke Company of Coalmont, on the Tulameen river, each mined coal in development-work, but have not as yet entered the market as producers.

EAST KOOTENAY COALFIELD.

In the East Kootenay coalfield, the old agreement as to wages, etc., which had existed between the operators and the employees, expired on March 31st, 1911, and considerable difficulty was experienced in arranging a new one, the negotiations occupying nearly eight months, during which time the collieries of this section of British Columbia and also of the adjoining portion of Alberta were shut down. The new agreement was, however, eventually signed, and holds binding until March, 1915.

Regular work began again about the first of the year, and the mines have been in operation all of the year 1912.

There were three companies operating in this district—the Crow's Nest Pass Coal Company, operating two separate collieries, the combined output of which was 950,706 tons; the Corbin Coke and Coal Company, which made an output of 122,263 tons; and the Hosmer Mines, Limited, which produced 188,243 tons of coal, making a gross output for the district for 1912 of 1,261,212 tons of coal. This gross output is nearly three times as great as the output of the previous year, when, however, the mines only worked for four months, and is within 100,000 tons of the output of 1910.

In addition to the coal mined, 915 tons was taken from stock, making the amount of coal distributed from the collieries 1,262,127 tons.

Of this gross tonnage, 396,905 tons was used in the manufacture of coke, of which there was produced 264,333 tons (2,240 lbs.).

In addition to the coke sold this year and the 91 tons used under the companies' boilers, 944 tons was added to stock, making the coke production for this year 264,333 tons, as compared with 66,005 tons in 1911.

Comparisons of the coal, or coke, output of this district during 1912 with the previous year are, however, misleading, as the mines were only worked for four months of that year, but the production is nearly up to that of 1910.

The following table shows the distribution made of the coal of this district:—

Sold as coal in Canada	231,076 tons.
Sold as coal in United States.....	551,742 "

Total sold as coal	782,818 tons.
Used by the company in making coke	396,905 "
Used by the company under boilers	82,404 "

	1,262,127 tons.
<i>Minus</i> coal taken from stock	915 "

Gross output	1,261,212 tons.

GOLD.

The production of placer gold during the past year was worth about **Placer Gold.** \$555,500 as nearly as can be ascertained: great difficulty is found in obtaining reliable figures, since the work is, in many cases, carried out by individuals or unorganized groups of men who keep no books, frequently paying wages, or for supplies, in gold-dust, which, being readily transported, is scattered, and the tax imposed thereon by law is thus evaded.

The production of 1911 was the lowest recorded in seventeen years, or since 1894, but this year's output shows a decided improvement—an increase, as compared with 1911, of \$129,500—and is, in fact, the greatest production of placer gold since 1908.

As was noted in 1911, the water conditions during the latter part of the season were such as to prevent the usual "clean-ups," and it is probable that much gold, then uncollected, has been recovered this season, which would partly account for this year's higher production; all of which goes to illustrate how dependent the industry is on the weather conditions.

The known and available placer deposits are undoubtedly becoming exhausted, and, until new camps shall have been discovered, the placer-gold output may be expected to continue diminishing.

There have been reported discoveries of new placer fields in Cassiar the past season, but as yet their value has not been tested by actual workings.

Practically all the placer gold was obtained in the Atlin and Cariboo Districts—the former being credited with a production of \$290,000 and the latter with \$238,000, leaving but a small balance for the remainder of the Province.

The value of the gold produced from lode-mining in the Province during **Gold from Lode-** the year 1912 was \$5,322,442, an increase, as compared with the previous **mining.** year, of \$596,929, or about 12.6 per cent. Increases in lode-gold production have been made this year in the Boundary, due to an increased tonnage of ore mined, and in the Rossland camp, due to the higher assay value of the ore treated; the Nelson Mining Division about held its own this year, but there has been a decreased production in the Coast District.

The following are the values of the gold product of the three most important camps: Rossland, \$2,729,949; Boundary, \$2,167,229; and Nelson, \$361,994. About 75 per cent. of the gold production of the Province is obtained from the smelting of copper-bearing ores, the remainder from stamp-milling.

The only large stamp-mill in operation in the Province is at the *Nickel Plate* mine at Hedley, in the Osoyoos Mining Division, which, this past year, milled some 70,456 tons of ore having a value of about \$775,000. There are smaller stamp-mills operating at the *Poorman*, *Queen*, *Motherlode*, and other mines in the Nelson Division.

SILVER.

The total amount of silver produced in the Province during the year 1912 was 3,132,108 oz., valued at \$1,810,045, an increase in amount, as compared with the previous year, of 1,239,744 oz., and in value of \$851,752.

The year 1911 showed an unduly low production of silver owing to the labour troubles at the collieries shutting off the coke-supply and so closing down the smelters, so it is fairer to make a comparison with earlier years. The silver output of 1912 is the greatest we have had since 1905, and exceeds that of 1910—a normal year—by 681,867 oz. in quantity and by \$565,029 in value.

A very large proportion of the silver produced in the Province is found associated with lead-bearing ores, chiefly in the Slocan District, where a few mines are still handicapped by lack of transportation facilities owing to forest fires having destroyed the Kaslo & Slocan Railway and, in some instances, the plants of the mines.

The *St. Eugene* mine in East Kootenay, formerly a large producer of silver and lead, has temporarily at least, run out of the ore-shoot, and made a very much decreased output, which was, however, partly compensated for by the reopening, by the Consolidated Company, of the *Sullivan* mines.

The Slocan District—including the Ainsworth, Slocan, Slocan City, and Trout Lake Mining Divisions—produced about 61 per cent. of the total Provincial output of silver this year, and the Fort Steele Mining Division about 12 per cent., all from argentiferous galena. The remainder is chiefly derived from the smelting of copper-ores carrying silver.

LEAD.

The lead production of the Province for the year 1912 was 44,871,454 lb. of lead, having a market value of \$1,805,627, showing, as compared with the previous year, an increase in amount of 17,999,057 lb. of lead, or 67 per cent., and an increase in value of \$736,106, or 68.8 per cent.

This amount of lead represents the amount of metallic lead actually recovered, and paid for, by the smelters, and tallies very closely with their receipts.

Owing to the large accumulation of stock at the smelter and to certain losses in slags throughout the year, the lead-refinery during this year only produced 35,252,000 lb. of finished product.

Instead of taking account of "loss in slags," we have followed, as has been our habit, the practice of the smelters of deducting 10 per cent. from the market price of the metal, in calculating the value.

The average market price of this metal for the year 1912 was a little higher than for the previous year.

The causes militating against the output of silver even more seriously affected the production of lead: but it is expected that this trouble will be largely remedied by next year.

The lead production is this year, as usual, derived chiefly from the Fort Steele Mining Division, as is shown in the following table:—

Fort Steele M.D. produced	18,238,238	lb. lead =	40.64	per cent. of total.
Ainsworth "	4,863,894	"	10.83	"
Slocan "	16,914,811	"	37.75	"
Nelson "	2,293,000	"	5.10	"
Trout Lake "	229,366	"	0.50	"
All others "	2,302,145	"	5.18	"
	<hr/>		<hr/>	
	44,871,454		100.00	

COPPER.

The amount of copper produced in the Province in 1912, smelted during the year, was 51,456,537 lb. fine copper, valued at the average New York market price for copper at



Cement-works, Portland Cement and Construction Co., under Construction at Bamerton, Sannick Arm.



Cement-works under Construction at East Princeton.

\$8,408,513. These figures represent the amount of copper actually recovered, as nearly as it is possible to ascertain: the amount of copper really in the ores mined would be approximately 25 per cent. greater.

This is the largest production of copper ever made in the Province, exceeding the previous "banner year"—1908—by 4,181,923 lb.

As compared with the year 1911, there is this year an increased production in amount of 14,528,881 lb., or nearly 31 per cent., and in value of \$3,836,869, or 84 per cent.

The following table shows the production of the various districts for the years 1909, 1910, 1911, and 1912:—

Boundary District.	1909.	1910.	1911.	1912.	
Boundary District.	40,603,042 lb.	31,354,985 lb.	22,327,359 lb.	33,372,199 lb.	= 64.76 %
Rossland	3,509,909 "	3,577,745 "	3,429,702 "	2,539,900 "	5.03 "
Coast & Cassiar	1,297,722 "	3,078,090 "	11,017,872 "	15,518,181 "	30.16 "
Yale-Kamloops	.....	1,178 "	152,723 "	.....	....
Nelson	186,572 "	231,936 "	.....	26,257 "	0.05 "
	45,597,245 "	38,243,934 "	36,927,656 "	51,456,537 "	100.00 "

The average assays of the copper-ores of the various camps, based upon the copper recovered, were as follows:—

Boundary, 0.87 per cent.; Coast, 3.625 per cent.; and Rossland, 0.521 per cent.

ZINC.

The total quantity of zinc produced in 1912 was 5,358,280 lb., valued at \$316,139, the New York price, less 15 per cent., being taken as the basis of valuation.

This comparatively small production was made chiefly by the *Lucky Jim* mine, in the Slocan District—the only mine in the Province mining ore primarily for its zinc-contents—materially assisted by the *Van-Roi*, *Standard*, and to a lesser extent by the *Noble Five* mines, all in the Slocan, and by the *Monarch* mine, near Field, in the Golden Mining Division, all of which produced zinc-concentrates as a by-product from the treatment of silver-lead ores.

This output is considerably less than it was estimated would be produced, which is accounted for by the fact that a couple of the largest producers did not market, before the close of the year, more than about half of the product actually made during the year.

The various processes designed to separate the values of the lead-zinc-silver ores of the Slocan, which have been within the past few years experimented with, have not as yet reached a stage of commercial application.

OTHER MINERALS.

Although, undoubtedly, there are in the Province numerous iron-ore deposits of very considerable size and exceptionally free from injurious elements, none of these have been utilized, as there is no market for iron-ore, and consequently little development-work has been done.

In the Coast District the iron-ores are all magnetites, as far as have been developed in any quantity, and, although these sometimes contain sulphur, as pyrite, they are singularly free from other impurities.

So far as is at present known, there is no body of hematite or other ore of iron, such as would be desirable to mix with the magnetites for blast-furnace smelting.

This fact, together with the present price of coke on the Coast, of from \$7 to \$8 a ton, with little likelihood of its being less while the price of coal continues so high, does not seem to justify the expectation of an iron-smelting industry here until these conditions are altered.

Whether it will be found possible to smelt the iron-ores of the Coast with anthracite coal from the recently discovered coalfields of the upper Skeena river, it is too early to predict, until the general character of the fuel is more clearly demonstrated and proper transportation facilities to the Coast have been provided.

As to the electro-thermic smelting of such iron-ores into commercial pig-iron, the process has not as yet been sufficiently perfected, although it is looked upon as one of the possibilities of the future.

Considerable interest has been manifested during the past year in the magnetite-iron deposits of Texada and Vancouver islands, as well as other points on the Coast, with a view to their commercial utilization.

There have been reports of the intended installation of an iron-smelting plant on the Coast, but nothing at all conclusive has yet become public.

While platinum is found in many of the alluvial gold-workings where **Platinum.** it can be saved as a by-product, the saving of it, in a small way, is attended with so much trouble that it has been practically neglected and no appreciable production made.

During the past year a great deal of excitement was created in the Province by reports of the finding by A. G. French, of platinum in commercial quantity in certain dykes near Nelson.

These reports were based upon statements, credited to A. Gordon French, that he had personally determined platinum, and metals of that group, and found them to exist in commercial quantities in dykes in the *Granite-Poorman* mine and other localities adjacent to Nelson.

Certain local assayers and a Philadelphia firm claimed to have confirmed Mr. French's statements.

The wide publicity given to these statements by the press, and otherwise, occasioned the staking of numerous claims on dykes in that vicinity.

The importance of the discovery, if true, was recognized by this Bureau, and steps were taken to try to confirm it.

In the fall of 1912 the Provincial Mineralogist, assisted by an Inspector of Mines, sampled a number of these dykes, while samples of other dykes were obtained from the owners. These samples were all duly pulped at the Government Laboratory, and identical samples sent to some half-dozen of the best-known expert chemists of Canada, the United States, and England, to be assayed for metals of the Platinum group.

The results received from these chemists, with one exception, have been decidedly negative, and this Bureau is not able to confirm the existence of platinum or any metals of that group in the vicinity of Nelson.

The details of investigations made are given elsewhere in this Report.

 BUILDING MATERIALS.

The growth of cities, with the necessity for fireproof building material, has created an industry that promises to rival any other branch of mineral production.

The past year, although the statistical returns are not as complete as desired, a production of about \$3,435,722 is accounted for, the details of which production are given in Table V., on page 9.

Excellent building-stone of various sorts is found in abundance in almost every part of the Province, but the fact of its widespread distribution has, however, been somewhat against the establishment of large quarrying industries, as a sufficient local supply could always be obtained, and, except within reach of the larger cities, few regularly equipped quarries have been opened.

On the Coast, chiefly between Vancouver Island and the Mainland, there are several well-equipped quarries taking out granite, sandstone, and andesite, all of excellent quality. These quarries supply the stone building material of the Coast cities, and also export to the United States.

A detailed description of the more important quarries was given in the report of this Bureau for 1904.

In the interior of the Province, the Canadian Marble & Granite Company opened a marble-quarry on the line of the Lardo-Trout Lake Railway, about eight miles from Lardo. This company has, so far, shipped only the rough blocks of the marble which were elsewhere sawn into slabs, etc., but during the past year the company has been engaged in erecting dressing-works, which are not yet in running order. The product shipped from the quarry has been small.

A coarsely crystalline whitish marble, not suitable for cutting into slabs, has been quarried on the shore of Kootenay lake, and used for building purposes in Nelson and elsewhere.

The Nootka Marble Quarries, on Nootka sound, on the west coast of Vancouver Island, that were opened in 1908, have not made any important shipments. The quarry has not been operated since July, 1909.

The production of red brick during the past year amounts in value to \$354,500. The demand, however, keeps well ahead of even the supply, particularly in the Coast cities, so that approximately half the brick used in Vancouver is imported. The plants in the vicinity of Vancouver, besides being increased in size, are being equipped with more modern appliances and should be able to meet outside competition. The price of common brick ranged from \$8 to \$11 per thousand, according to quality and demand.

The only company producing firebrick in the Province is the Clayburn Company, Limited, with a plant at Clayburn, where the beds of clay are of the age of the coal-measures. This company made approximately 2,800 M. firebrick, worth about \$56,000, and 4,000 M. front or face brick, worth about \$100,000. Besides this the company made a large number of common brick, tiles, drain-pipes, etc.

The British Columbia Pottery Company at Victoria West manufactures drain and sewer pipe, chimney-tiles, etc., the chief item in their sales account being drain and sewer pipe. The output for the year approached \$130,000. The company derives its clay partly from the coal-mines of the Canadian Collieries, Limited, at Comox, and partly from a shale-quarry recently opened up on the west coast of Vancouver Island.

The manufacture of lime is conducted in a small way at a large number of points in the Province, but only on the Coast has any attempt been made at more extensive operations. In the neighbourhood of Victoria, on Esquimalt harbour, Raymond & Sons have three kilns in operation, and there are kilns on Saanich Arm. On Texada Island—in addition to the old plant at Marble bay—a new and extensive plant has been erected at Blubber bay. The limestone being used is of exceptional purity, but in some instances the limestone-beds are cut by igneous dykes which have to be rejected, and this somewhat increases the costs of quarrying.

The only company manufacturing cement in the Province is the **Portland Cement**. Vancouver Portland Cement Company, with works at Tod inlet, on the Saanich arm, about twelve miles from Victoria. The capacity of these works at present is from 2,000 to 2,500 barrels a day, and this past year the company manufactured over 520,000 barrels of cement, valued in the neighbourhood of \$800,000. The raw materials, limestone and clay, are quarried on the company's property adjoining the works. The company has doubled the capacity of the plant, installing electric power to take the place of, or supplement, the steam plant, and introducing many labour-saving appliances.

The Portland Cement and Construction Company has been installing a large plant at the head of the Saanich arm, but production has not yet been begun.

Another company has erected buildings and is putting in plant at East Princeton, Similkameen.

It is understood that a company has secured land and suitable deposits in the vicinity of Prince Rupert, and that the construction of a large plant will be begun in the near future.

Concrete construction has become so extensive on the Coast that **Crushed Rock and Gravel** companies have been formed to supply suitable material for such work. Near Vancouver harbour four companies have opened quarries in a granite rock, and have erected crushing and sizing plants and bins for the manufacture of crushed rock for concrete-making and for road-making in Vancouver. The output of these stone quarrying and crushing plants, in the vicinity of Vancouver alone, amounted last year to \$275,000.

Near Vancouver and Victoria, companies have been formed for supplying washed sand and gravel, properly screened to size; at least some of those companies have installed a system of mining the gravel by hydraulic streams and the carrying of the product to the screens by the water used. The value of the sand and gravel produced for use in these two cities amounted during the past year to over \$382,310.

BUREAU OF MINES.

WORK OF THE YEAR.

The work of the Bureau of Mines increases, of necessity, year by year, and this growing activity is due to the following causes: The extension of the mining area of the Province, with the proportional increase in the number of mines; the increasing desire of the outside public for the free information which the Bureau supplies with regard to the various mining districts and camps, and the appreciation by the prospector of the fact that he may obtain, gratis, a determination of any rock or mineral which he may send to the Bureau.

The routine work of the office, and the preparation and publication of the Report for the year just ended, followed by the examination in the field of as many of the mines and mining districts as the season would permit, together with the work of the Laboratory and instruction of students, fully occupied the staff for the year. The staff of the Bureau consists of the Provincial Mineralogist, the Provincial Assayer, and an assistant in the Laboratory, with a clerical assistant in the office.

After the report for the preceding year had been issued, the Provincial Mineralogist, with assistants, held an examination at Victoria of candidates for Certificates of Competency as Assayers, which lasted a week, after which he was fully occupied with necessary office-work until the season was sufficiently advanced for field-work.

In February, 1912, the Provincial Mineralogist attended, at Vancouver, a meeting of the Western Branch of the Canadian Mining Institute.

The meeting dealt particularly with the coal resources of the Province, and a number of valuable papers were read.

An explosion having occurred on March 9th, 1912, at Merritt, in the mine of the Diamond Vale Colliery Company, the Provincial Mineralogist was instructed by the Honourable the Minister of Mines to proceed to the scene of the disaster, and, in company with the Chief Inspector, to make an examination of the mine and to investigate as to the origin of the explosion.

This examination, together with the attendance and giving evidence at the Coroner's inquest, occupied until March 23rd.

The report of the investigation is given later in this Report.

In July the Provincial Mineralogist with a small party proceeded by Canadian Pacific Railway steamer from Victoria to Wrangel, Alaska, at the mouth of the Stikine river, where, after some delay, a gasoline-launch was obtained and the party transported up the Stikine river to Telegraph Creek, a distance of about 160 miles.

At this point horses were obtained and a trip was made into the Dease Lake district—the scene of the Cassiar placer-gold excitement of the early '70's—and here the operating placer-mining properties on Dease and Thibert creeks were examined.

Returning to Telegraph Creek, a fresh start was made—this time having for its destination the coalfield surrounding the headwaters of the Skeena, Stikine, and Nass rivers, and known publicly as the Groundhog coalfield, so called since Groundhog mountain, over which the trail from Hazelton passes, lies at the southern end of the field.

After a rather hurried examination of the field the party caught a returning pack-train to Hazelton, which was reached about the middle of September, and a return made to Victoria by way of Prince Rupert.

Accounts of these trips will be found in the body of this Report.

At the request of the Honourable the Minister of Mines the Provincial Mineralogist, on October 1st, proceeded to Nelson to investigate the reported finding of metals of the Platinum group in certain dykes in that vicinity.

A number of samples of these dykes were taken personally, and in addition further samples were obtained from the owners of properties on which it had been reported these precious metals were to be found.

The method of assay employed by Mr. French, and by which he had claimed to obtain results showing an appreciable amount of the platinum metals in these dykes, was obtained from him, and the actual manipulation of this method by Mr. French and assistants, lasting several days, was witnessed.

Returning to Victoria on October 22nd, the samples obtained at Nelson were very carefully pulped under the personal supervision of the writer, when a number of duplicate pulps, together with copies of the method of assaying employed by Mr. French, were sent to several of the most reputable and expert chemists in Canada, England, and the United States, for the determination of the platinum group metals in these samples.

The results obtained by these chemists are given in this Report under the heading of the Nelson Mining Division.

In December the Board of Examiners for Assayers met in the Government Laboratory and held an examination of candidates for Certificates of Competency as Assayers; the examination occupied a week.

The Provincial Mineralogist has to record with much regret the retirement from the public service of Herbert Carmichael, who resigned on December 31st, 1912, in order to attend to his personal affairs.

Mr. Carmichael had occupied the position of Government Analyst since 1891, of Government Assayer since 1892, and acted for a number of years past as Assistant Mineralogist, reporting as such, on a number of the mining camps in British Columbia, more particularly in the Coast District.

In the retirement of Mr. Carmichael the Bureau of Mines loses the services of a more than usually expert chemist and assayer, together with a fund of unwritten data and information which it will be very difficult to replace.

ASSAY OFFICE.

The following is a summary of the work of the Assay Office of the Bureau of Mines for the year 1912, as reported by the Provincial Assayer, Herbert Carmichael:—

During 1911 the Laboratories and Mineral Exhibit Building were moved back to Superior street, and were opened again for business on January 1st, 1912.

During the year 1912 there were made by the staff in the Government Assay Office 1,964 assays or quantitative determinations; of these, a large number were for the Bureau of Mines or for the other departments, for which no fees were received. The fees collected by the office were as follows:—

Fees for assaying	\$970 00
" melting and assaying gold-dust and bullion	78 00
" assayer's examinations.....	255 00

Total cash receipts.....	\$1,303 00
Determinations and examinations made for other Government departments for which no fees were collected	300 00

Value of assaying done.....	\$1,603 00

The value of gold melted during the year 1912 was \$10,217 in 39 lots, as against \$9,853 in 32 lots in 1911.

Considerable time was spent in an investigation of a process for the separation of zinc and lead in the galena-blend ores of the Slocan Mining Division. This work necessitated a large number of quantitative determinations and other work. Towards the close of the year the time of the Laboratory was occupied largely in the investigation of minerals which it was claimed contained platinum.

The results of these tests (given elsewhere) showed conclusively that little or no platinum existed in such ores.

Some years ago, in this Province, nickel was erroneously reported from numerous places. It was found that the assayers let a part of the iron in solution pass through the filter-paper, then precipitated it and supposed it to be nickel, when if it had been properly precipitated and filtered off in the first place it would have left nothing to be precipitated later.

In the separation of gold, silver, and platinum, it has been the practice with many local assayers to dissolve the total metals, get out the gold and silver, and if there was any loss call it platinum, or to weigh up part of the gold as platinum. Such methods have cost the unfortunate investor many thousands of dollars.

In addition to the above quantitative work, a large number of **Free** qualitative determinations, or tests, were made in connection with the **Determinations.** identification and classification of rocks or minerals sent to the Bureau for a report; of these no count was kept, nor were any fees charged, as it is the established custom of the Bureau to examine and test qualitatively, without charge, samples of minerals sent in from any part of the Province, and to give a report on the same. This has been done for the purpose of encouraging the search for new or rare minerals and ores, and to assist prospectors and others in the discovery of new mining districts, by enabling them to have determined, free of cost, the nature and probable value of any rock they may find. In making these free determinations, the Bureau asks that the locality from which the sample was obtained be given by the sender.

EXAMINATION FOR ASSAYERS.

REPORT OF HERBERT CARMICHAEL, SECRETARY OF BOARD OF EXAMINERS.

I have the honour, as Secretary, to submit the Annual Report of the Board of Examiners for Certificates of Competency and Licence to Practise Assaying in British Columbia, as established under the "Bureau of Mines Act Amendment Act, 1899."

An examination was held at the laboratory of the Trail smelter on February 5th and following days, at which two candidates came up for examination and one passed.

An examination was also held at Victoria, in the Government Laboratory, on April 29th and the following days. Three candidates came up for examination and all passed.

Another examination was held at the Government Laboratory, Victoria, on December 13th. Three candidates came up for examination: two passed and one failed.

Other meetings of the Board of Examiners were held during the year, and the Board recommended that four licences to practise assaying be granted without examination under subsection (2), section 2, of the Act. In accordance with these recommendations, certificates have been duly issued by the Honourable the Minister of Mines.

LIST OF ASSAYERS HOLDING PROVINCIAL CERTIFICATES OF EFFICIENCY UNDER THE
"BUREAU OF MINES ACT AMENDMENT ACT, 1899."

(Only the holders of such certificates may practise assaying in British Columbia.)

Under section 2, subsection (1).

Ayres, D. A.	Moyie.	Martin, S. J.	Hazelton.
Austin, John W.	Hazelton.	Marsh, Richard	Republic, Wash.
Baekus, Geo. S.	Britannia Beach.	Marshall, H. Jukes.	Vancouver.
Baker, C. S. H.	Greenwood.	Marshall, William S.	Ladysmith.
Barke, A. C.		Miles, Arthur D.	
Belt, Sam'l Erwin		Mitchell, Charles T.	Copper Cliff, Ont.
Bernard, Pierre	Monte Christo, Wash.	McCormick, Alan F.	Ruth, Nevada.
Bishop, Walter	Grand Forks.	MacDonald, Alex. C.	Vancouver.
Buchanan, James	Trail.	Nicholls, Frank	Norway.
Buchman, A. C.	Trail.	O'Sullivan, John	Vancouver.
Campbell, Colin	New Denver.	Parker, Robt. H.	
Carmichael, Norman	Clifton, Arizona.	Parsenow, W. L.	Victoria.
Church, George B.		Perkins, Walter G.	Basin, Montana.
Cobeldick, W. M.	Scotland.	Pickard, T. D.	Vancouver.
Collinson, H.	Stewart.	Pirrie, Noble W.	Vancouver.
Comrie, George H.		Richmond, Leigh	Duncan, B.C.
Cranford, A. J. F.	Rossland.	Robertson, T. R.	
Crerar, George		Rodgers, Ch. B.	Vancouver.
Cruikshank, G.	Trail.	Rombauer, A. B.	Butte, Mont.
Day, Athelstan	Dawson.	Schroeder, Curt. A.	
Dedolph, Ed.	Ottawa, Ont.	Segsworth, Walter	Toronto, Ont.
Doekrill, Walter R.	Cheminaius.	Sharpe, Bert N.	
Dunn, G. W.	Rossland.	Sim, Charles John	England.
Farquhar, L. B.	Vancouver.	Snyder, Blanchard M.	
Fingland, John J.	Kaslo.	Steven, Wm. Gordon	
Grosvenor, F. E.	Vancouver.	Stewart, James W.	Portland Canal.
Hamilton, Wm. J.	Grand Forks.	Stümmel, B. A.	Trail.
Hannay, W. H.	Rossland.	Sundberg, Gustave	Mexico City.
Hart, P. E.		Tally, Robert E.	Spokane, Wash..
Hawkins, Francis	Silverton.	Thomas, Percival W.	
Hawes, F. B.	Ladysmith.	Tretheway, John H.	
Hook, A. Harry	Greenwood.	Turner, H. A.	
Hunter, C. S.	Prince Rupert.	Vance, John F. C. B.	Vancouver.
Irwin, Geo. E.	Vancouver.	Van Agnew, Frank	Siberia.
John, D.	Haileybury, Ont.	Vaughan-Williams, V. L.	California.
Kiddie, Geo. R.	Observatory Inlet.	Wales, Roland T.	
King, R.	Greenwood.	Watson, Wm. J.	Ladysmith.
Kitto, Geoffrey B.	Victoria.	Welch, J. Cuthbert	Butte, Mont.
Langley, A. S.	Crofton.	Wells, Ben T.	Ladysmith.
Lee, Fred. E.	Trail.	West, Geo. G.	Vancouver.
Lee, Geo. M.	Grand Forks.	Whittaker, Delbert E.	Victoria.
Ley, Richard N.	Vancouver.	Widdowson, E. Walter	Nelson.
Lindsay, W. W.	Rossland.	Williams, W. A.	Grand Forks.
Longworth, F. J.	Boyds, Wash.	Williams, Eliot H.	
Lukens, I. F.	Seattle.	Wimberly, S. H.	Nevada, U.S.A..

Under section 2, subsection (2).

Archer, Allan.....	Musgrave, William N.....	Mexico City.
Brennan, Charles Victor....	Mussen, Horace W.....	Siberia.
Browne, R. J.....	McArthur, Reginald E.....	
Browne, P. J.....	McDiarmid, S. S.....	
Bryant, Cecil M.....	McGinnis, Wm. C.....	Queen Charlotte Islands.
Blaylock, Selwyn G.....	McKay, Robt. B.....	Vancouver.
Burwash, N. A.....	McLellan, John.....	Queen Charlotte Islands.
Cartwright, Cosmo T.....	McMurtry, Gordon O.....	
Cavers, Thomas W.....	McNab, J. A.....	Thompson, Nevada.
Clothier, George A.....	McPhee, W. B.....	
Cole, Arthur A.....	McVicar, John.....	Edmonton, Alta.
Cole, G. E.....	MacLennan, F. W.....	
Cole, L. Heber.....	Newton, W. E.....	Silverton.
Conway, E. J.....	Outhett, Christopher.....	Kamloops.
Coskthard, R. W.....	Pemberton, W. P. D.....	Victoria.
Cowans, Frederick.....	Reid, J. A.....	Greenwood.
Dawson, V. E.....	Ritchie, A. B.....	Nelson.
Dixon, Howard A.....	Rose, J. H.....	
Earlley-Wilmot, V. L.....	Scott, Oswald Norman.....	
Galbraith, M. T.....	Shannon, S.....	
Gilman, Ellis P.....	Sharpe, G. P.....	Midland, Ont.
Green, J. T. Raoul.....	Shorey, P. M.....	Trail.
Guess, George A.....	Sloan, David.....	Three Forks.
Gwillim, J. C.....	Stevens, F. G.....	Mexico.
Heal, John H.....	Sullivan, Michael H.....	Trail.
Hilliary, G. M.....	Sutherland, T. Fraser.....	
Holdich, Augustus H.....	Swinney, Leslie A. E.....	
Johnston, William Steele.....	Thomson, H. Nellis.....	Anaconda, Montana.
Kaye, Alexander.....	Thomson, Robt. W.....	
Kendall, George.....	Watson, A. A.....	Olalla.
Kilburn, Geo. H.....	Watson, Henry.....	
Lathe, Frank E.....	Workuan, Ch. W.....	
Lay, Douglas.....	Wright, Richard.....	Rossland.
Lewis, Francis B.....	Wynne, Lewellyn C.....	
Merrit, Charles P.....	Yuill, H. H.....	
Murphy, C. J.....		

Under section 2, subsection (3).

Carmichael, Herbert.....	McKillop, Alexander.....	Vancouver.
(Provincial Assayer.)	Pellew-Harvey, Wm.....	London, England.
Harris, Henry.....	Robertson, Wm. F.....	Victoria.
Hedley, Robt. R.....	(Provincial Mineralogist.)	
Kiddie, Thos.....	Marshall, Dr. T. R.....	London, England.
Sutton, W. J.....		

PREVIOUSLY ISSUED UNDER THE "BUREAU OF MINES ACT, 1897," SECTION 12.

Pinder, W. J.....	Thompson, James B.....	Vancouver.
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EXAMINATIONS FOR COAL-MINE OFFICIALS.

The "Coal-mines Regulation Act," as now consolidated and amended, provides that all officers of a coal-mining company having any direct charge of work underground shall hold Government Certificates of Competency, which are to be obtained only after passing an examination before a duly qualified Board, appointed for the purpose of holding such examinations, and known as the Managers' Board.

The certificates granted on the recommendation of such Board and the requirements shall be as follows:—

"In no case shall a certificate of competency be granted to any candidate until he shall satisfy the Board of Examiners—

"(a.) If a candidate for a manager, that he is a British subject and has had at least five years' experience in and about the practical workings of a coal-mine, and is

at least twenty-five years of age ; or, if he has taken a degree in scientific and mining training, including a course in coal-mining at a university or mining school approved by the Minister of Mines, that he has had at least four years' experience in and about the practical working of a coal-mine :

- “(b.) If a candidate for overman, that he has had at least five years' experience in and about the practical working of a coal-mine, and is at least twenty-three years of age :
- “(c.) If a candidate for shiftboss, fireboss, or shotlighter, that he has had at least three years' experience in and about the practical working of a coal-mine, is the holder of a certificate of competency as a coal-miner, and is at least twenty-three years of age :
- “(d.) A candidate for a certificate of competency as manager, overman, shiftboss, fireboss, or shotlighter shall produce a certificate from a duly qualified medical practitioner or St. John's or other recognized ambulance society, showing that he has taken a course in ambulance-work fitting him, the said candidate, to give first aid to men injured in coal-mining operations.

“For the purposes of this section the experience demanded by such section shall be of such character as the Board shall consider of practical value in qualifying the candidate for the position to which such class of certificate applies.

“Experience had in a mine outside of the Province may be accepted should the Board consider such of equal value.”

Any certificate is considered as including that of any lower class.

EXAMINATION FOR MINERS.

In addition to the examinations and certificates already specified as coming under the Managers' Board, the Act further provides that every coal-miner shall be the holder of a certificate of competency as such. By “miner” is meant “a person employed underground in any coal-mine to cut, shear, break, or loosen coal from the solid, whether by hand or machinery.”

Examinations for a miners' certificate are held each month at each colliery by a Board of Examiners, known as the Miners' Board, and consisting of an examiner appointed by the owners, an examiner elected by the miners of that colliery, and an examiner appointed by the Government.

BOARD OF EXAMINERS FOR COAL-MINE OFFICIALS.

FIRST, SECOND, AND THIRD-CLASS CERTIFICATES.

Report of Secretary of Board, Tully Boyce.

I beg to submit the Annual Report covering the transactions, of the above Board for the year ending December 31st, 1912.

The Board consists of Thos. R. Stockett, of Nanaimo, Chairman ; George Williams, of Nanaimo, Vice-Chairman ; Tully Boyce, of Nanaimo, Secretary ; Thomas Graham, of Victoria, Chief Inspector of Mines ; Andrew Bryden, of Merritt ; and David G. Wilson, of Hosmer.

The meetings are held in the office of the Board at Nanaimo. Examinations were held for First-, Second-, and Third-class Certificates at Nanaimo, Cumberland, Merritt, and Fernie on May 7th, 8th, and 9th, 1912.

The total number of candidates at this examination was 95, as follows: For first-class, 18, of whom 4 passed, 14 failed; for second-class there were 20, of whom 14 passed, 6 failed; for third-class, 57, of whom 31 passed, 26 failed.

Another examination for First-, Second-, and Third-class Certificates was held at Nanaimo, Cumberland, Merritt, and Fernie, on October 29th, 30th, and 31st, 1912.

At this examination the total number of candidates was 47, as follows: For first-class there were 9 candidates, of whom 6 passed, 3 failed; for second-class there were 14 candidates, of whom 9 passed, 5 failed; for third-class there were 24, of whom 21 passed, 3 failed.

The fullest information as to the standard of efficiency required and copies of previous questions in printed form may be had by applying to the Secretary at Nanaimo.

I append hereto a list of the candidates who successfully passed the examinations in the various classes, and have taken out their certificates.

The following persons have only partly complied with the requirements of the Act, and are consequently not as yet entitled to Certificates of Competency:—

First-class Candidates.

NAME.	DATE.	No.
Arthur Phelan	November, 1912	

Second-class Candidates.

NAME.	DATE.	No.
John B. Wyllie	August, 1905	
Daniel Russell	November, 1907	
John Gardner	July, 1908	
Watkin Williams	September, 1910	
John H. Brownrigg	June, 1911	

Third-class Candidates.

NAME.	DATE.	No.
Henry McMillan	May, 1905	
Jabez Ashman	February, 1907	
E. O. Saville	October, 1907	
Thomas Brown	July, 1908	
Frank J. G. Dollimere	May, 1909	
Eddy Limb	June, 1911	
Robert Walker	" 1912	
Thomas Eccleston	" 1912	
Peter Carr	November, 1912	

LIST OF CANDIDATES TO WHOM CERTIFICATES WERE ISSUED AT THE EXAMINATIONS HELD
ON MAY 7TH, 8TH, AND 9TH, AND ON OCTOBER 29TH, 30TH, AND 31ST, 1912,
AT NANAIMO, CUMBERLAND, MERRITT, AND FERNIE.

FIRST-CLASS CANDIDATES.

NAME.	DATE.	No.
John Howard Cunningham.....	May 9th, 1912	
Henry Ernest Miard.....	"	
Henry Leighton.....	"	
William Shaw.....	"	
Edward Willey.....	October 31st, 1912	
Andrew Anderson Millar.....	"	
James Dickson.....	"	
Francis Glover.....	"	
William John Mazey.....	"	

SECOND-CLASS CANDIDATES.

NAME.	DATE.	No.
William Roper.....	May 9th, 1912	B 141
Joseph Lane.....	"	B 142
Richard Cox.....	"	B 143
Ralph Waldo Mayer.....	"	B 144
Albert Manfold.....	"	B 145
John Quinn.....	"	B 146
James Touley.....	"	B 147
Charles O'Brien.....	"	B 148
Peter Myers.....	"	B 149
John Todd Brown.....	"	B 150
Carmichael McNay.....	"	B 151
Samuel Richards.....	"	B 152
Jacob Stobbart.....	"	B 153
John Hutton.....	"	B 154
Morris Wilbur Garman.....	October 31st, 1912	B 155
Martin McGarry.....	"	B 156
Matthew Littler.....	"	B 157
Thomas Strang.....	"	B 158
David Shanks.....	"	B 159
John Robertson Kirkwood.....	"	B 160
Richard Gurbett.....	"	B 161
Alexander Dewar.....	"	B 162
William Whitehouse.....	"	B 163

THIRD-CLASS CANDIDATES.

NAME.	DATE.	No.
Matthew Gunniss.....	May 9th, 1912	C 460
James Nimmo.....	"	C 461
James Steele.....	"	C 462
Evan Thomas Davies.....	"	C 463
Hugh Davidson.....	"	C 464
John Dando.....	"	C 465
Thomas Harvey.....	"	C 466
George Gray.....	"	C 467
Thomas Tully.....	"	C 468
James Nicholson.....	"	C 469
Robert Gourley.....	"	C 470

THIRD-CLASS CANDIDATES.—*Concluded.*

NAME.	DATE.	No.
James Hendry	May 9th, 1912	C 471
David Morris	"	C 472
Jonathan Pearson	"	C 473
David John Gordon	"	C 474
Walter Cleaves	"	C 475
Elijah Tune	"	C 476
John Bell	"	C 477
John Joshua	"	C 478
Robert Johnston	"	C 479
Walter Pattison Clark	"	C 480
William Neilson	"	C 481
William Watkins	"	C 483
Matthew Meek	"	C 484
James McLaughlin	"	C 485
Thomas Smith	"	C 486
Wallace Starr	"	C 488
William Shaw Rankin	"	C 489
Alexander McFagen	"	C 490
Thomas James Wood	October 31st, 1912	C 491
Thomas Rowbottom	"	C 492
Edward McMillan	"	C 493
Thomas Bann	"	C 494
Robert Fowler	"	C 495
James Alexander Walker	"	C 496
Robert Oakes	"	C 498
James White	"	C 499
Alexander Rowan	"	C 500
James Maltman	"	C 501
James Blair	"	C 502
Robert Potter	"	C 503
James Wardrop	"	C 504
James Gemmell	"	C 505
Edward Royle	"	C 506
John Ireson	"	C 507
Edward Griffith	"	C 508
John Thompson	"	C 509
Thomas Hartley	"	C 510
George Elmes	"	C 511

Registered List of Holders of Certificates of Competency as
Coal-mine Officials.

FIRST-CLASS CERTIFICATES.—SERVICE CERTIFICATES ISSUED UNDER SECTION 39, "COAL
MINES REGULATION ACT, 1877."

John Bryden, Victoria.	Archibald Dick, Government Inspector of Mines.
Edward G. Prior.	James Dunsmuir, Victoria.
Thomas A. Buckley.	James Cairns, Comox, Farmer.

FIRST-CLASS CERTIFICATES OF COMPETENCY ISSUED UNDER "COAL MINES
REGULATION ACT, 1897."

NAME.	DATE.
Shepherd, Francis H.	March 5th, 1881
Honobin, William	May 1st, 1882
Little, Francis D.	" 1st, "
Martell, Joshua.....	" 1st, "
Chandler, William.....	December 21st, 1883
Priest, Elijah.....	" 21st, "
McGregor, James.....	January 18th, 1888
Randle, Joseph.....	" 18th, "
Matthews, John.....	" 8th, 1889
Norton, Richard Henry.....	August 26th, "
Bryden, Andrew.....	December 30th, "
Russell, Thomas.....	April 20th, 1891
Sharp, Alexander.....	October 27th, "
Kesley, John.....	March 4th, 1892
Wall, William H.....	May 30th, 1896
Morgan, Thomas.....	" 30th, "
Wilson, David.....	" 30th, "
Smith, Frank B.....	" 30th, "
Bradshaw, George B.....	June 12th, 1899
Simpson, William G.....	" 12th, "
Hargreaves, James.....	February 5th, 1901
Driman, Robert G.....	" 5th, "
Browitt, Benjamin.....	August 3rd, "
Stockett, Thomas, Jr.....	" 3rd, "
Pearson, Robert.....	" 3rd, "
Cunliffe, John.....	" 3rd, "
Evans, Daniel.....	" 3rd, "
McEvoy, James.....	October 17th, 1902
Wilson, A. R.....	" 17th, "
Simister, Charles.....	" 17th, "
Budge, Thomas.....	" 17th, "
Mills, Thomas.....	" 17th, "
Faulds, Alexander.....	" 17th, "
Richards, James A.....	" 17th, "
McLean, Donald.....	January 21st, 1905
Wilkinson, Geo.....	" 21st, "
Wright, H. B.....	" 21st, "
Coulthard, R. W.....	" 21st, "
Roaf, J. Richardson.....	" 21st, "
John, John.....	" 21st, "
Manley, H. L.....	" 21st, "

FIRST-CLASS CERTIFICATES ISSUED UNDER "COAL MINES REGULATION ACT FURTHER
AMENDMENT ACT, 1904."

NAME.	DATE.
Baxter, Andrew	June 10th, 1911
Biggs, J. G.	July 22nd, 1908
Bonar, Robert	October 28th, 1911
Bridge, Edward	July 22nd, 1908
Caufield, B.	May 1st, 1909
Church, James A. H.	June 10th, 1911
Crowder, James	" 10th, "
Cunningham, John Howard	May 9th, 1912
Darbyshire, James	November 9th, 1907
Davidson, W. A.	May 1st, 1909
Davies, David	June 10th, 1911
Devlin, Henry	May 1st, 1909
Dixon, James	October 31st, 1912
Elliott, Daniel	November 9th, 1907
Emmerson, Joseph	" 9th, "
Evans, Evan	" 9th, "
Fairfoull, Robert	June 10th, 1911
Foy, Joseph	" 10th, "
France, Thos	November 22nd, 1906
Fraser, Norman	March 4th, 1905
Freeman, H. N.	May 1st, 1909
Galloway, C. F. J.	July 22nd, 1908
Glover, Francis	October 31st, 1912
Graham, Charles	November 14th, 1905
Graham, Thomas	" 9th, 1907
Gray, James	" 27th, 1909
Heatheote, Elijah	March 4th, 1905
Henderson, Robert	November 27th, 1909
Holden, James	May 1st, "
Howells, Nathaniel	October 28th, 1911
Humphries, Clifford	June 10th, "
Jackson, Thos. R.	November 9th, 1907
James, William	July 22nd, 1908
Keith, Thomas	November 9th, 1907
Kellock, George	June 10th, 1911
Kinsman, A. D.	September 10th, 1910
Knox, T. K.	July 27th, 1909
Lancaster, W.	" 22nd, 1908
Leighton, Henry	May 9th, 1912
Loekhart, Wm.	" 1st, 1909
Macauley, D. A.	June 10th, 1911
McCulloch, J.	September 10th, 1910
McGuikie, Thomas	July 22nd, 1908
McMillan, J. H.	September 10th, 1910
McVicar, Samuel	May 1st, 1909
Mazey, William John	October 31st, 1912
Miard Henry Ernest	May 9th, "
Millar, John K.	November 22nd, 1906
Miller, Andrew Anderson	October 31st, 1912
Montgomery, John W.	May 1st, 1909
Mordy, Thomas	September 10th, 1910
Musgrave, J. T.	October 28th, 1911
Newton, John	July 22nd, 1908
Peacock, Frank David	October 28th, 1911
Powell, J. W.	June 10th, "
Saville, Luther	July 22nd, 1908
Shanks, John	May 1st, 1909
Shaw, Alex	November 14th, 1905
Shaw, William	May 9th, 1912
Shenton, T. J.	September 10th, 1910
Shone, Samuel	May 1st, 1909
Sloan, Hugh	November 27th, "
Smith, A. E.	October 28th, 1911
Smith, Joseph	July 22nd, 1908
Spicer, J. E.	October 28th, 1911

FIRST-CLASS CERTIFICATES ISSUED UNDER "COAL MINES REGULATION ACT FURTHER AMENDMENT ACT, 1904."—*Concluded.*

NAME.	DATE.
Spruston, T. A.	November 27th, 1909
Stevens, L. C.	" 27th, "
Stewart, R. T.	September 10th, 1910
Strachan, Robert	March 4th, 1905
Strang, James.	June 10th, 1911
Thomas, J. D.	September 10th, 1910
Thorne, B. L.	" 10th, "
Wallbank, J.	" 10th, "
Willey, Edward	October 31st, 1912
Williams, Thos. H.	November 22nd, 1906
Wylie, John.	July 22nd, 1908

SECOND-CLASS CERTIFICATES OF SERVICE.

NAME.	DATE.	Cer. No.
Corkhill, Thomas	March 4th, 1905.	B 7
Morton, T. R.	" 4th, "	B 8
Lee, John S.	" 4th, "	B 9
Millar, J. K.	" 4th, "	B 10
McCliment, John	" 4th, "	B 11
Martin, David	" 4th, "	B 12
Hunt, John	" 4th, "	B 13
Walker, David	" 4th, "	B 14
Short, Richard	" 4th, "	B 15
Powell, William Baden	" 4th, "	B 16
Sharp, James.	" 18th, "	B 17
Bryden, Alexander.	" 4th, "	B 18

SECOND-CLASS CERTIFICATES OF COMPETENCY ISSUED UNDER "COAL MINES REGULATION ACT FURTHER AMENDMENT ACT, 1894."

NAME.	DATE.	Cer. No.
Adamson, Robert.	September 10th, 1910	B 120
Anderson, Robert.	" 10th, "	B 119
Barelay, Andrew	July 29th, 1905	B 25
Bastian, John	November 2nd, 1907	B 42
Bevis, Nathaniel.	September 10th, 1910	B 123
Biggs, J.	May 1st, 1909	B 94
Biggs, John G.	November 2nd, 1907	B 40
Brace, Thomas.	" 27th, 1909	B 96
Bridge, Edward	October 23rd, 1906	B 33
Brown, David	September 10th, 1910	B 108
Brown, James L.	October 28th, 1911	B 136
Brown, John C.	" 23rd, 1906	B 39
Brown, John Todd .	May 9th, 1912	B 150
Brown, R. J.	October 28th, 1911	B 134
Bushell, J. P.	May 1st, 1909	B 81
Carroll, Henry	July 22nd, 1908	B 62
Caufield, Bernard	October 23rd, 1906	B 30
Cawthorne, L.	May 1st, 1909	B 93
Churchill, James.	July 22nd, 1908	B 65
Commons, Wm	September 10th, 1910	B 115
Cook, Joseph.	July 22nd, 1908	B 64
Courtney, A. W.	October 28th, 1911	B 138

SECOND-CLASS CERTIFICATES OF COMPETENCY ISSUED UNDER "COAL MINES REGULATION
ACT FURTHER AMENDMENT ACT, 1904."—Continued.

NAME.	DATE.	Cer. No.
Cox, Richard	May 9th, 1912	B 143
Crawford, David	" 1st, 1909	B 88
Cunliffe, T.	" 1st, "	B 78
Daniels, David	November 2nd, 1907	B 53
Darbyshire, James	October 23rd, 1906	B 32
Davies, Stephen	September 10th, 1910	B 113
Devlin, Henry	November 2nd, 1907	B 44
Dewar, Alexander	October 31st, 1912	B 162
Dunsmuir, John	November 14th, 1905	B 26
Dykes, J. W.	May 1st, 1909	B 77
Eccleston, Wm	" 1st, "	B 87
Evans, Evan	March 11th, 1905	B 2
Fairfoull, R.	May 1st, 1909	B 83
Finlayson, James	July 29th, 1905	B 21
Foster, W. R.	November 27th, 1909	B 102
France, Thos	" 14th, 1905	B 27
Francis, Enoch	May 1st, 1909	B 86
Francis, James	July 22nd, 1908	B 63
Freeman, Henry N.	November 2nd, 1907	B 45
Garbett, Richard	October 31st, 1912	B 161
Garman, Morris Wilbur	" 31st, "	B 155
Gillespie, Hugh	July 29th, 1905	B 24
Gillespie, John	October 23rd, 1906	B 36
Gillespie, John M.	June 10th, 1911	B 126
Graham, Chas	March 4th, 1905	B 1
Gray, David	May 1st, 1909	B 76
Henderson, Robert	July 22nd, 1908	B 60
Horrocks, Abner G.	June 10th, 1911	B 130
Howells, N.	November 27th, 1909	B 97
Hudson, George	September 10th, 1910	B 121
Hughes, John C.	" 10th, "	B 109
Hutton, John	May 9th, 1912	B 154
Jackson, Thos. R.	March 4th, 1905	B 5
James, David	November 2nd, 1907	B 58
Jarrett, Fred	May 1st, 1909	B 84
Jaynes, Frank	September 10th, 1910	B 111
John, Howell	" 10th, "	B 122
Johnson, Moses	May 1st, 1909	B 75
Jones, William	July 29th, 1905	B 20
Jones, William T.	" 22nd, 1908	B 66
Jordon, Thos	November 27th, 1909	B 104
Kirkwood, John Robertson	October 31st, 1912	B 160
Knowles, James E.	" 28th, 1911	B 137
Lancaster, William	November 2nd, 1907	B 50
Lane, Joseph	May 9th, 1912	B 142
Lee, Robert John	September 10th, 1910	B 110
Littler, Matthew	October 31st, 1912	B 157
Lockhart, William	" 23rd, 1906	B 34
Luck, George	June 10th, 1911	B 128
Manifold, Albert	May 9th, 1912	B 145
Massey, H.	November 27th, 1909	B 99
Mather, Thomas	June 10th, 1911	B 127
Mattishaw, S. K.	October 28th, "	B 135
Matusky, A.	May 1st, 1909	B 91
Mayer, Ralph Waldo.	" 9th, 1912	B 144
Mazay, W. J.	November 27th, 1909	B 101
Merryfield, William	July 22nd, 1908	B 61
Miard, Hy. E.	September 10th, 1910	B 107
Middleton, Robert	July 22nd, 1908	B 72
Monks, James	November 2nd, 1907	B 55
Morgan, John	" 2nd, "	B 43
Morris, John	July 22nd, 1908	B 67
Morton, Robert W.	" 22nd, "	B 59
Musgrave, J.	May 1st, 1909	B 90
Myers, Peter	" 9th, 1912	B 149

SECOND-CLASS CERTIFICATES OF COMPETENCY ISSUED UNDER "COAL MINES REGULATION
ACT FURTHER AMENDMENT ACT, 1904."—*Concluded.*

NAME.	DATE.	Cer. No.
McDonald, J. A.	October 28th, 1911	B 133
McFegan, W.	November 27th, 1909	B 106
McGarvey, Martin	October 31st, 1912	B 156
McGuckie, Thomas M.	" 23rd, 1906	B 35
McKelvie, J.	May 1st, 1909	B 92
McKendrick, And.	September 10th, 1910	B 112
McKinnell, David.	October 23rd, 1906	B 37
McMillan, D.	June 10th, 1911	B 125
McNay, Carmichael	May 9th, 1912	B 151
McPherson, James E.	July 22nd, 1905	B 73
Neen, Joseph	June 10th, 1911	B 129
Nellist, David	March 4th, 1905	B 6
Newton, John	October 23rd, 1906	B 31
Newton, Wm.	September 10th, 1910	B 116
O'Brien, Charles	May 9th, 1912	B 148
O'Brien, George	" 1st, 1909	B 82
Ovington, John	November 2nd, 1907	B 52
Parkinson, T.	May 1st, 1909	B 80
Parnham, Charles	November 2nd, 1907	B 49
Quinn, John	May 9th, 1912	B 146
Rankin, Geo.	November 27th, 1909	B 103
Raynes, M. T.	October 28th, 1911	B 139
Reid, Thomas	July 29th, 1905	B 23
Reid, Wm.	October 28th, 1911	B 132
Renny, James.	" 28th, "	B 140
Richards, Thomas	November 2nd, 1907	B 57
Richards, Samuel	May 9th, 1912	B 152
Rigby, John	July 29th, 1905	B 29
Roberts, Ebenezer	September 10th, 1910	B 117
Robinson, William.	July 22nd, 1905	B 69
Rogers, George	May 1st, 1909	B 79
Raper, William	" 9th, 1912	B 141
Russell, John	November 2nd, 1907	B 47
Saville, Luther	" 2nd, "	B 51
Shanks, David	October 31st, 1912	B 159
Shaw, Alex	July 29th, 1905	B 19
Somerville, Alex.	March 4th, "	B 4
Spruston, Thos. A.	November 2nd, 1907	B 46
Stafford, Matthew.	June 10th, 1911	B 131
Stewart, J. M.	May 1st, 1909	B 95
Stobbart, Jacob	" 9th, 1912	B 153
Stockwell, William	November 2nd, 1907	B 56
Strang, Thomas	October 31st, 1912	B 158
Thomas, J. B.	November 27th, 1909	B 105
Thomas, Joseph D.	October 23rd, 1906	B 38
Thompson, Joseph	September 10th, 1910	B 114
Touhey, James	May 9th, 1912	B 147
Tonge, Thomas	July 22nd, 1905	B 71
Vanhulle, Peter	November 2nd, 1907	B 54
Virgo, J.	May 1st, 1909	B 89
Watson, Adam G.	November 14th, 1905	B 28
Webber, John Frank	March 4th, "	B 3
Wesledge, W.	November 27th, 1909	B 98
White, John	" 2nd, 1907	B 48
Whitehouse, William	October 31st, 1912	B 163
Wilson, Thomas	July 22nd, 1905	B 74
Wilson, W.	" 22nd, "	B 70
Worthington, Joseph	May 1st, 1909	B 85

THIRD-CLASS CERTIFICATES ISSUED UNDER "COAL MINES REGULATION ACT FURTHER
AMENDMENT ACT, 1904."

NAME.	DATE.	Cer. No.
Adamson, Robert	May 1st, 1909	C 323
Aleen, Alexander	October 28th, 1911	C 430
Almond, Alex	" 1st, 1907	C 252
Almond, W.	July 22nd, 1908	C 286
Anderson, John	October 28th, 1911	C 437
Archibald, Thomas	" 28th, "	C 454
Bann, Thomas	" 31st, 1912	C 494
Baggaley, J.	July 22nd, 1908	C 300
Barker, Robert	June 10th, 1911	C 415
Barlow, B. R.	May 1st, 1909	C 337
Barnes, B. J.	" 1st, "	C 346
Bauld, Wm.	June 10th, 1911	C 422
Baxter, Robert	October 28th, "	C 450
Beeton, D. H.	May 1st, 1909	C 338
Bell, John	" 9th, 1912	C 477
Bennie, John	June 10th, 1911	C 411
Beveridge, Wm	" 10th, "	C 396
Biggs, John	March 4th, 1905	C 210
Biggs, Thomas	October 28th, 1911	C 449
Birchell, Richard	" 1st, 1907	C 266
Blair, James	" 31st, 1912	C 502
Blewett, Ernest	July 22nd, 1908	C 298
Bradley, William	" 22nd, "	C 291
Bridge, Edward	" 29th, 1905	C 223
Briseoe, F.	" 22nd, 1908	C 369
Brown, David	November 1st, 1909	C 348
Brown, James	September 10th, 1910	C 364
Brown, James	June 10th, 1911	C 412
Brown, John	September 10th, 1910	C 392
Brown, Robert	October 28th, 1911	C 451
Brown, Robert D.	June 10th, "	C 423
Brown, Robert S.	" 10th, "	C 408
Brownrigg, J. H.	July 22nd, 1908	C 276
Bullen, Thomas	September 10th, 1910	C 379
Bushell, Jas. P.	October 1st, 1907	C 264
Cairnes, Andrew	June 10th, 1911	C 420
Calverly, Joseph	September 10th, 1910	C 375
Camamile, Hollis	October 28th, 1911	C 443
Catepole, Charles	July 29th, 1905	C 227
Cautfield, J.	May 1st, 1909	C 321
Challoner, Arthur	October 28th, 1911	C 433
Cheetham, Ben.	July 22nd, 1908	C 311
Chester, John	October 28th, 1911	C 440
Clark, Lewis	June 10th, "	C 405
Clark, Walter Pattison	May 9th, 1912	C 480
Clarkstone, Wm. W	October 28th, 1911	C 431
Cleaves, Walter	May 9th, 1912	C 475
Clifford, William	July 22nd, 1908	C 313
Commons, William	" 22nd, "	C 304
Cooke, Joseph	March 4th, 1905	C 209
Coulthard, James	June 10th, 1911	C 407
Crawford, David	March 4th, 1905	C 208
Cunningham, G. F.	November 11th, "	C 229
Cunliffe, Thos	October 1st, 1907	C 265
Dando, John	May 9th, 1912	C 465
Davidson, Hugh	May 9th, 1912	C 464
Davies, Evan Thomas	" 9th, "	C 463
Davis, William	" 1st, 1909	C 339
Derbyshire, A.	June 10th, 1911	C 401
Dewar, Alex.	September 10th, 1910	C 369
Devlin, Edward	October 23rd, 1906	C 241
Dingsdale, Geo.	" 28th, 1911	C 459
Doherty, J. J.	May 1st, 1909	C 340
Doney, John	March 4th, 1905	C 201
Donnachie, John	June 10th, 1911	C 425

THIRD CLASS CERTIFICATES ISSUED UNDER "COAL MINES REGULATION ACT FURTHER
AMENDMENT ACT, 1904."—*Continued.*

NAME.	DATE.	Cer. No.
Doodson, Robert	October 28th, 1911	C 455
Douglas, D. B.	" 23rd, 1906	C 235
Dykes, Isaac	June 10th, 1911	C 409
Dykes, Joseph W.	October 1st, 1907	C 248
Elmes, George	October 31st, 1912	C 511
Evans, D.	July 22nd, 1908	C 284
Ewart, Alex.	September 10th, 1910	C 374
Fairfoull, James	October 28th, 1911	C 453
Fitzpatrick, T. J.	" 28th, "	C 452
Ford, Allen	" 28th, "	C 445
Fowler, Robert	" 31st, 1912	C 495
Francis, James	" 1st, 1907	C 250
Freeman, H. G.	November 14th, 1905	C 230
Frew, A.	" 27th, 1909	C 360
Frodsham, Vincent	July 22nd, 1908	C 282
Garbett, Richard	September 10th, 1910	C 377
Gemmill, James	October 31st, 1912	C 505
Glen, James	" 28th, 1911	C 435
Gordon, Davis John	May 9th, 1912	C 474
Gourley, Robert	" 9th, "	C 470
Graham, John	July 22nd, 1908	C 292
Gray, George	May 9th, 1912	C 467
Gulloth, Edward	October 31st, "	C 508
Gunniss, Matthew	May 9th, "	C 460
Hallinan, W.	" 1st, 1909	C 313
Halsall, J.	July 22nd, 1908	C 307
Hamilton, John	October 28th, 1911	C 444
Bartley, Thomas	" 31st, 1912	C 510
Harwood, Fred	September 10th, 1910	C 384
Harvey, Thomas	May 9th, 1912	C 466
Harvie, George	September 10th, 1910	C 378
Hayes, Edward	May 1st, 1909	C 320
Heaps, Robert	September 10th, 1910	C 373
Hemney, Jonathan	June 10th, 1911	C 424
Henry, James	May 9th, 1912	C 471
Hilley, Fred	July 22nd, 1908	C 290
Hilton, R. G.	September 10th, 1910	C 376
Hodson, R. H.	March 4th, 1905	C 216
Horbury, Joseph W.	June 10th, 1911	C 406
Horrocks, A. G.	May 1st, 1909	C 324
Horwood, S.	July 22nd, 1908	C 312
Howells, Nathaniel	May 1st, 1909	C 316
Huby, Norman	June 10th, 1911	C 394
Hutchison, Ben	November 14th, 1905	C 232
Hutchison, F.	" 27th, 1909	C 358
Ireson, John	October 31st, 1912	C 507
Irvine, David	June 10th, 1911	C 413
Jarrett, Fred, J.	October 1st, 1907	C 256
Jaynes, Frank	July 22nd, 1908	C 277
Jemson, J. W.	March 4th, 1905	C 205
Jenkins, John	September 10th, 1910	C 390
John, Howel	July 22nd, 1908	C 305
Johnson, Moses	October 1st, 1907	C 258
Johnston, Robert	May 9th, 1912	C 479
Jones, W. T.	March 4th, 1905	C 221
Joshua, John	May 9th, 1912	C 478
Joyce, W.	November 27th, 1909	C 361
Judge, Peter	September 10th, 1910	C 391
Keenan, Wm. James	June 10th, 1911	C 426
Kirkeberg, H. S.	November 27th, 1909	C 350
Lancaster, William	October 23rd, 1906	C 243
Lane, Joseph	" 1st, 1907	C 254
Leeman, T.	May 1st, 1909	C 345
Lewis, Benj. J.	September 10th, 1910	C 386
Liddle, John	July 29th, 1905	C 228

THIRD-CLASS CERTIFICATES ISSUED UNDER "COAL MINES REGULATION ACT FURTHER
AMENDMENT ACT, 1904."—Continued.

NAME.	DATE.	Cer. No.
Littler, John	June 10th, 1911	C 410
Littler, Matthew	" 10th, "	C 417
Littler, Robert	" 10th, "	C 418
Livingstone, Alex.	October 28th, "	C 436
Loxton, George	June 10th, "	C 428
Loxton, John	" 10th, "	C 416
Lynch, Stewart	October 28th, "	C 432
Mackie, John	June 10th, "	C 421
Makin, J. Wm.	September 10th, 1910	C 385
Malme, Patrick	October 1st, 1907	C 247
Maltman, James	" 31st, 1912	C 501
Mansfield, A.	May 1st, 1909	C 336
Manson, T. D.	July 22nd, 1908	C 280
Marsh, John	October 1st, 1907	C 270
Martin, James	June 10th, 1911	C 398
Mason, J.	July 22nd, 1908	C 297
Massey, Henry	May 1st, 1909	C 317
Mather, Thomas	July 22nd, 1908	C 293
Mattishaw, Samuel K.	October 23rd, 1906	C 237
Matusky, Andrew	" 1st, 1907	C 259
Mawson, J. T.	November 27th, 1909	C 359
Meek, Matthew	May 9th, 1912	C 484
Merrifield, George	October 23rd, 1906	C 239
Merrifield, William	" 23rd, "	C 236
Miles, John	June 10th, 1911	C 414
Millar, Peter	September 10th, 1910	C 388
Mitchell, C.	May 1st, 1909	C 322
Mitchell, Henry	September 10th, 1910	C 366
Monks, James	November 14th, 1905	C 234
Moore, George	October 23rd, 1906	C 242
Moore, J.	May 1st, 1909	C 335
Moreland, Thomas	July 22nd, 1908	C 299
Morgan, John	" 29th, 1905	C 224
Morris, David	May 9th, 1912	C 472
Myers, Peter	October 28th, 1911	C 446
McAlpine, John	March 4th, 1905	C 217
McBroom, Al.	July 2nd, 1908	C 287
McCulloch, James	May 1st, 1909	C 315
McDonald, John	October 28th, 1911	C 448
McFagan, Alexander	May 9th, 1912	C 490
McFegan, W.	" 1st, 1909	C 319
McGary, M.	" 1st, "	C 326
McGuckie, Thomas	July 29th, 1905	C 226
McKelvie, J.	" 22nd, 1908	C 285
McKenzie, Peter	June 10th, 1911	C 427
McKinley, John	October 28th, "	C 412
McLaughlin, James	May 9th, 1912	C 485
McLachlan, Alex.	June 10th, "	C 419
McLean, M. D.	September 10th, 1910	C 389
McLellan, William	March 4th, 1905	C 219
McLeod, James	July 22nd, 1908	C 296
McMillan, B.	September 10th, 1910	C 363
McMillan, Edward	October 31st, 1912	C 493
McNay, Carmichael	July 22nd, 1908	C 306
McNeill, Adam T.	" 22nd, "	C 281
McNeill, Robert	September 10th, 1910	C 387
Neen, Joseph	November 27th, 1909	C 352
Nelson, Horatio	October 1st, 1907	C 263
Neilson, William	May 9th, 1912	C 481
Nicholson, James	" 9th, "	C 469
Nimmo, James	" 9th, "	C 461
Oakes, Robert	October 31st, 1912	C 498
O'Brien, Charles	November 27th, 1909	C 349
Or, Alexander	October 28th, 1911	C 434
Oswald, Geo. L.	September 10th, 1910	C 370

THIRD-CLASS CERTIFICATES ISSUED UNDER "COAL MINES REGULATION ACT FURTHER
AMENDMENT ACT, 1904."—*Continued.*

NAME.	DATE.	Cer. No.
Owen, T.	May 1st, 1909	C 347
Parker, L.	" 1st, "	C 341
Parkinson, T.	July 22nd, 1908	C 289
Pearson, Jonathan	May 9th, 1912	C 473
Perry, James	March 4th, 1905	C 215
Philips, T.	November 27th, 1909	C 356
Pickup, A.	July 22nd, 1908	C 310
Pieton, W.	May 1st, 1909	C 333
Plank, Samuel	November 14th, 1905	C 233
Potter, Robert	October 31st, 1912	C 503
Price, Walter	September 10th, 1910	C 371
Puckey, Wm. R.	" 10th, "	C 368
Quinn, James	October 28th, 1911	C 441
Quinn, John	" 28th, "	C 429
Rallison, R.	July 22nd, 1908	C 279
Rankin, George	" 22nd, "	C 275
Rankin, Wm. Shaw	May 9th, 1912	C 489
Ratcliffe, Thomas	October 1st, 1907	C 253
Raynor, Fred	" 1st, "	C 257
Reid, Robert	September 10th, 1910	C 383
Reid, Wm.	June 10th, 1911	C 403
Reilly, Thomas	July 22nd, 1908	C 303
Renny, Jas.	November 27th, 1909	C 354
Richards, James	" 1st, 1907	C 249
Richards, Samuel	October 23rd, 1906	C 244
Richardson, J. H.	" 28th, 1911	C 458
Rigby, John	July 29th, 1905	C 225
Roberts, E.	May 1st, 1909	C 327
Robinson, M.	" 1st, "	C 332
Roper, William	July 22nd, 1908	C 274
Rowan, Alexander	October 31st, 1912	C 500
Rowbottom, Thomas	" 31st, "	C 492
Royce, Edward	" 31st, "	C 506
Russell, Robert	November 27th, 1909	C 351
Rutledge, Edwin	July 22nd, 1908	C 302
Scott, Henry	" 22nd, "	C 294
Shanks, David	September 10th, 1910	C 372
Sharp, James	May 1st, 1909	C 325
Sharples, J. P.	September 10th, 1910	C 380
Shearer, L.	May 1st, 1909	C 330
Shentfield, W.	November 27th, "	C 357
Shipley, John W.	October 28th, 1911	C 456
Shooter, Joseph	" 1st, 1907	C 261
Shortman, J.	May 1st, 1909	C 331
Simister, J. H.	November 27th, "	C 353
Simuster, W.	May 1st, "	C 334
Skelton, Thos.	" 1st, "	C 344
Smith, A. E.	September 10th, 1910	C 367
Smith, Joseph	March 4th, 1905	C 207
Smith, Thos. J.	October 1st, 1907	C 271
Smith, Thomas	May 9th, 1912	C 486
Sparks, Edward (C 311 issued in lieu of C 255 destroyed by Fernie fire)	October 1st, 1907	C 255
Spencer, G.	May 1st, 1909	C 329
Sprunsten, R. L.	November 27th, "	C 355
Sprunston, Thomas A.	March 4th, 1905	C 206
Stafford, M.	September 10th, 1910	C 382
Starr, Wallace	May 9th, 1912	C 488
Steele, James	" 9th, "	C 462
Steele, Walter	October 28th, 1911	C 439
Stewart, James M.	" 23rd, 1906	C 240
Steckwell, William	" 23rd, "	C 238
Strang, Thomas	June 10th, 1911	C 400
Strang, Wm.	" 10th, "	C 395
Snik, George	May 1st, 1909	C 318
Taylor, Charles M.	March 4th, 1905	C 213

THIRD-CLASS CERTIFICATES ISSUED UNDER "COAL MINES REGULATION ACT FURTHER
AMENDMENT ACT, 1904."—*Concluded.*

NAME.	DATE.	Cer. No.
Taylor, J. T.	October 28th, 1911	C 447
Taylor, Leroy	September 10th, 1910	C 381
Thomas, Thomas	" 10th, "	C 365
Thomas, John B.	November 14th, 1905	C 231
Thomas, Joseph	March 4th, "	C 220
Thomas, Warriett	October 1st, 1907	C 273
Thompson, Thomas	" 1st, "	C 267
Thompson, John	" 31st, 1912	C 509
Thompson, Joseph	" 1st, 1907	C 269
Thomson, Duncan	March 4th, 1905	C 218
Tally, Thomas	May 9th, 1912	C 468
Tune, Elijah	" 9th, "	C 476
Walker, Jas. Alexander	October 31st, "	C 496
Wallace, Fred	" 1st, 1907	C 260
Warburton, Ernest Leonard	June 10th, 1911	C 399
Wardrop, James	October 31st, 1912	C 504
Watkins, William	May 9th, "	C 483
Watson, Adam G.	March 4th, 1905	C 212
Watson, George	July 22nd, 1908	C 288
Watson, William	October 22nd, 1906	C 246
Webb, Herbert	" 28th, 1911	C 457
Weeks, John	March 4th, 1905	C 214
White, James	October 31st, 1912	C 499
White, John	" 22nd, 1906	C 245
Whitehouse, Wm.	June 10th, 1911	C 402
Wilcock, J.	July 22nd, 1908	C 308
Wilkinson, Edward	October 28th, 1911	C 438
Williams, John Sam.	June 10th, "	C 404
Williams, Watkin	" 22nd, 1908	C 301
Wilson, Robinson	" 10th, 1911	C 397
Wilson, Thomas	October 1st, 1907	C 272
Wilson, William	" 1st, "	C 262
Winstanley, H.	July 22nd, 1908	C 283
Wintle, Thomas A.	" 29th, 1905	C 222
Wood, Thos. James	October 31st, 1912	C 491
Worthington, J.	July 22nd, 1908	C 295

COAL-MINES OFFICIALS.

Third-class Certificates issued under "Coal Mines Regulation Act Further Amendment Act, 1904," sec. 38, subsec. (2), in exchange for Certificates issued under the "Coal Mines Regulation Act Amendment Act, 1901."

Name.	Date.	Certificate No.	Name.	Date.	Certificate No.
Adam, Robert	Oct. 12, 1904	C 42	Marshall, John	May 3, 1904	C 21
Addison, Thos.	Dec. 10, 1904	C 52	Marshall, Howard	Dec. 6, 1905	C 127
Aitken, James	Oct. 24, 1904	C 44	Matthews, Chas.	April 27, 1904	C 9
Alexander, Wm	Feb. 17, 1905	C 72	Miand, Harry E.	March 3, 1905	C 76
Allsop, Harry	Oct. 11, 1904	C 34	Middleton, Robt.	Feb. 11, 1905	C 71
Aughinvale, Alex.	March 29, 1905	C 89	Miles, Thos.	Aug. 10, 1904	C 31
Barelay, Andrew	April 27, 1904	C 19	Miller, Thos. K.	Feb. 21, 1905	C 74
Barelay, James	April 27, 1904	C 20	McKenzie, John R.	Oct. 12, 1904	C 40
Barelay, John	April 17, 1905	C 111	McKinnell, David	March 29, 1905	C 99
Berry, James	Feb. 11, 1905	C 70	McKinnon, Arch'd.	April 3, 1905	C 102
Biekle, Thos.	Oct. 11, 1904	C 37	McMillan, Peter	March 29, 1905	C 94
Biggs, Henry	April 10, 1905	C 110	McMurtrie, John	March 29, 1905	C 96
Black, John S.	April 3, 1905	C 108	Moore, Wm. H.	June 17, 1905	C 119
Bowie, James	May 13, 1905	C 116	Morris, John	Dec. 27, 1904	C 57
Briseoe, Edward	Oct. 10, 1906	C 129	Myles, Walter	April 3, 1905	C 100
Campbell, Dan	March 29, 1905	C 93	Nash, Isaac	June 1, 1904	C 120
Carr, Jos. E.	Oct. 11, 1904	C 36	Neave, Wm.	Oct. 12, 1904	C 43
Carroll, Harry	March 29, 1905	C 98	Nellist, David	April 27, 1904	C 13
Clarkson, Alexander	April 27, 1904	C 18	Nelson, James	April 27, 1904	C 16
Collishaw, John	Feb. 7, 1905	C 68	Newton, John	Oct. 12, 1904	C 39
Comb, John	March 23, 1904	C 2	Nimmo, Jas. P.	April 3, 1905	C 103
Cosier, Wm	March 29, 1905	C 86	O'Brien, Geo.	Feb. 6, 1905	C 66
Courtney, A. W.	Nov. 2, 1904	C 45	Pengelly, Richard	Dec. 27, 1904	C 58
Crawford, Frank	April 6, 1904	C 7	Perrie, Jas.	March 15, 1905	C 81
Daniels, David	April 27, 1904	C 12	Perry, James	June 13, 1904	C 27
Davidson, David	April 3, 1905	C 106	Pounder, Geo.	Oct. 16, 1905	C 125
Davidson, John	March 29, 1905	C 87	Price, Jas.	Nov. 8, 1904	C 50
Devlin, Henry	Oct. 12, 1904	C 41	Ratter, Wm.	March 29, 1905	C 95
Dobbie, John	Nov. 27, 1905	C 126	Reid, Thos.	Nov. 3, 1904	C 47
Dudley, James	March 22, 1905	C 114	Reid, James	March 23, 1904	C 1
Duncan, Thomas	Aug. 29, 1906	C 128	Reid, Wm.	Dec. 15, 1904	C 14
Dunlap, Henry	Nov. 21, 1904	C 51	Richards, Thos.	April 27, 1904	C 54
Dunn, Geo.	Dec. 19, 1904	C 56	Ross, John	April 3, 1905	C 101
Dunsmuir, John	March 29, 1905	C 90	Ronghead, George	Jan. 30, 1907	C 130
Eccleston, Wm.	March 15, 1905	C 80	Ryan, John	Dec. 28, 1904	C 59
Evans, Evan	March 13, 1905	C 78	Sanders, John W.	April 3, 1905	C 107
Evans, W. H.	March 14, 1905	C 79	Shenton, Thos. J.	July 25, 1904	C 30
Fagan, David	April 6, 1905	C 109	Shepherd, Henry	June 13, 1904	C 26
Farmer, Bernard	Jan. 31, 1905	C 64	Smith, Ralph	March 7, 1905	C 77
Farquharson, John	April 27, 1904	C 17	Smith, Geo.	March 29, 1905	C 84
Findlayson, James	June 6, 1904	C 25	Somerville, Alex.	March 24, 1904	C 3
Fulton, Hugh T.	April 3, 1905	C 105	Stauss, Chas. F.	Feb. 9, 1905	C 69
Gibson, Edward	May 30, 1905	C 118	Steele, Jas.	March 29, 1905	C 92
Gilchrist, Wm.	March 29, 1905	C 85	Stewart, Duncan H.	March 28, 1904	C 4
Gillespie, Hugh	April 6, 1904	C 8	Stewart, John	April 3, 1904	C 104
Gillespie, John	April 6, 1904	C 5	Stewart, Daniel W.	May 16, 1904	C 23
Gould, Alfred	April 17, 1906	C 112	Stodhart, Jacob	Feb. 21, 1905	C 73
Green, Francis	Oct. 11, 1904	C 38	Strachan, Robt.	April 27, 1904	C 15
Handlen, Jas.	June 16, 1904	C 122	Strang, James	April 27, 1904	C 10
Harrison, Wm.	Feb. 3, 1905	C 65	Thomas, John	March 29, 1905	C 97
Haworth, Geo.	March 29, 1905	C 88	Tunstall, James	June 15, 1904	C 121
Hesscott, John	Jan. 16, 1905	C 62	Vass, Robt.	Dec. 12, 1904	C 53
Hutchison, Archie	Sept. 8, 1905	C 123	Vater, Charles	April 6, 1904	C 66
John, David	Nov. 8, 1904	C 49	Walkem, Thos.	Dec. 16, 1904	C 55
Johnson, Geo.	May 9, 1904	C 124	Webber, Chas.	Sept. 13, 1904	C 32
Johnson, Wm. R.	March 1, 1905	C 75	Webber, Charles F.	Sept. 13, 1904	C 33
Kerr, Wm.	March 29, 1905	C 91	Whiting, Geo.	May 29, 1905	C 117
Lander, Frank	Jan. 9, 1905	C 61	Wilson, Austin	Feb. 7, 1905	C 67
Landfear, Herbert	Jan. 27, 1905	C 63	Wilson, Thos.	April 27, 1904	C 11
Lewis, Thos.	Oct. 11, 1904	C 35	Woodburn, Moses	March 29, 1905	C 83
Lockhart, Wm.	Jan. 6, 1905	C 60	Yarrow, Geo.	Nov. 3, 1904	C 46
Malpass, James	Nov. 7, 1904	C 113			



On line of Grand Trunk Pacific Ry.—at "53 Mile."



Fenar River—at "53 Mile" of Grand Trunk Pacific.

CARIBOO DISTRICT.

CARIBOO MINING DIVISION.

REPORT BY C. W. GRAIN, GOLD COMMISSIONER.

I have the honour to submit herewith my report on the progress of the mining industry in the Cariboo Mining Division for the year ending December 31st, 1912.

The conditions in this district remain very much the same as they have been for the last three or four years; not exactly at a standstill, yet not progressing. This is owing, I think, solely to the transportation problem. Outside capitalists will not invest as long as freight charges are so high on machinery and merchandise. The district is still anxiously awaiting the coming of railways, on the arrival of which I confidently look for a renewal of the investment of capital in Cariboo.

Although there has not been any extensive development in this Division, there has been a considerable amount of work performed, both by companies and by individuals; but on the whole there has not been as much activity as I had expected, on account of investors waiting to see in what direction proposed railways are going before they really open out on any large scale.

As regards weather conditions, the last two seasons have been very dry (for this country) and comparatively small snowfalls, which, consequently, made a shortage in the water-supply, and a shortage of water is disastrous to the really successful working of our hydraulic mines: hydraulicking being the method by which the greater part of the gold yield of this district is at present produced. The output of all the working properties depends solely on the amount of gravel moved, and a dry season makes an appreciable difference in the amount of the output—in fact, regulates it. The last two winters have been poor as regards the snowfall, and when the snow did start to melt, it went very fast. The summers having been exceptionally dry, the piping seasons have been short, and, consequently, the output small.

This year, as near as I can gather, the Division has produced in the neighbourhood of \$200,000, somewhat better than last year, and though it may be said that the district is not progressing very much in the way of output, it evidently appears as a good investment to a considerable number, as the actual mining receipts show an increase over those of last year by nearly \$3,000, and the records of placer claims and placer leases issued also show an increase. In this district there are now 390 placer leases in good standing and thirty-two record placer claims, of which there have been taken up this year fifty-four leases and twelve record claims.

WILLIAMS CREEK AND TRIBUTARIES.

The only mines really working on this celebrated old creek and its tributaries are the mines worked and owned by John Hopp, namely: The *Forest Rose* on Williams creek, the *Mucho Oro* and *Wyoming* claims on Stouts gulch, and the *Lowhee* mine on Lowhee creek.

At the *Forest Rose* the piping season was spent in hydraulicking out a channel for the new sluice-flume, and setting the same, as the work progressed, with a view to running off the upper gravels directly into Williams creek, thus saving what remains of the old dump for the lower gravels. As most of this new channel was made through old workings, very little pay-gravel was encountered; therefore, one may say that last season's work was chiefly construction-work.

Considering the shortness of the season, good work was put in on the *Mucho Oro* on Stouts gulch. In places very rich gravel was struck, clearly proving that this claim is in no way worked out, and that it only requires abundant water to make a very good showing every year.

On the *Lowhee* property work was carried on as in other years, and a large quantity of gravel moved with very good results. The Lowhee dam proved very satisfactory and of great benefit, the extra amount of water thus obtained for ground-slucing purposes being found a great help.

At Mosquito creek a very satisfactory season's work was put in on the *Alabama* claim. Owing to rearrangement of the plant, this claim was worked with a considerably smaller force of men, but the gravel struck was as good as in former years. This claim gave a very good account of itself.

The West Canadian Deep Leads, Limited, continued its work on the three-compartment shaft to reach bed-rock, presumably at a depth of 260 feet. All last summer this company had considerable difficulty with the pumps, and as water was encountered in large quantities, the result was that a great deal of time was lost. I understand that this winter it is the intention of the management to get in considerable new machinery during the sleighing season; there is also talk of putting in a large drain-tunnel. It is hoped that the company will work again next spring, and finally get some return for the very large amount of money it has expended.

LIGHTNING CREEK AND TRIBUTARIES.

On the property of the Lightning Creek Gold Gravels and Drainage Company, Limited, at Wingdam, I am pleased to be able to state that work has been resumed and that some twenty-five or thirty men are now employed. It will be remembered that this company is sinking shafts with the object of working out the bed-rock gravels which in the early days were found to be very rich.

The Lightning Creek Hydraulic Mining Company continued work on the Lightning Creek property near the old town of Van Winkle, which ground was formerly known as the *South Wales* ground. The company employed a large force all summer, and, although troubled with lack of dump, managed to move a considerable amount of gravel. It was, however, not looking for big results this year, as considerable old-time workings had to be removed before pay-gravel could be reached.

The Venture Company on Peters creek did not work this year owing to failure to procure the necessary additional capital required to install a plant for the economical working of the property.

The Wormwold Creek Mining Company and the Four Leaf Clover Mining Company did little except construction-work on their properties.

On the Ogden Gold Mining Company's property on Lightning creek, which consists of four leases, I understand several test shafts have been sunk at an expenditure of \$5,000 or \$6,000, with satisfactory results.

On Summit creek very little work was done this past season, but I understand from the manager of the Summit Creek Hydraulic Mining Company, which owns several leases on the creek, that work will be carried on next year and a considerable amount of money spent on development-work.

On Sugar creek the Cooper Creek Mining Company did satisfactory work, but the season was short and quite a time was spent in road-work and getting in the pipe.

On Mustang creek a number of leases have been staked, and I look for a good amount of capital being spent there during the next season.

Hydrauliclicking operations were carried on on China creek, Nugget gulch, and on the old *Waverly* property, with practically the same results as in past years, but on all these properties the season was short.

LODE-MINING.

With regard to mineral or lode mining, really very little has been done in this district during the past year, the owners of mineral claims doing little more than the necessary assessment-work, some with very good results, but, naturally, none of them care to spend more than what is absolutely necessary to hold their claims until the transportation problem is solved.

The old B.C. Quartz Mine was baled out, R. R. Hedley superintending the work.

DREDGING.

With reference to dredging, this has not, as yet, been a commercial success in this district, but I would state that several leases have been taken up on the Fraser and Quesnel rivers. So far I have not heard of work having been started.

On Pleasant valley, T. Dickson, late superintendent of the Alder Creek (U.S.A.) Dredging Company, spent considerable time and money testing ground with a boring-machine, with the idea, if the ground proved suitable, of installing a dredging outfit on the ground, and I gather that he obtained very encouraging results.

OFFICE STATISTICS—CARIBOO MINING DIVISION.

Free miners' certificates issued to individuals	403
" " companies	9
Placer claims recorded	12
" re-recorded	22
Miners' leave of absence	22
Certificates of work issued	110
Mining leases issued	54
Water licences issued	14
Conveyances and other documents recorded	81

General Revenue Receipts.

Free miners' certificates	\$ 2,882	20
Mining receipts, general	12,790	90
Leaves of absence	52	50
Land sales	104,534	69
Land revenue	548	00
Water revenue	1,343	27
Revenue tax	828	00
Real-property tax	3,325	43
Personal-property tax	1,264	86
Wild-land tax	100,102	06
Income-tax	93	93
Licenees, marriage	70	00
" liquor	1,955	00
" trade	552	00
" game	100	00
Law-stamps	105	80
J.P. Court fines	552	50
Miscellaneous receipts	557	04
Mineral-tax	814	00
Total	\$232,472	18

CARIBOO MINING DIVISION.

NOTES ON THE MICA CLAIMS IN THE VICINITY OF TETE JAUNE CACHE, B.C.

BY HERBERT CARMICHAEL, PROVINCIAL ASSAYER.

Before leaving Victoria very little reliable information could be obtained as to the exact location of the mica properties, but it was certain that the easiest way to reach Tete Jaune Cache was via the Canadian Pacific Railway to Edmonton, and from that point westward over the Grand Trunk Pacific Railway.

Regular trains were running from Edmonton to Fitzhugh, near the eastern boundary of British Columbia, and from there to Mile 53 on the Grand Trunk Pacific survey, more or less regular work-trains were conveying the contractors, workmen, and supplies.

The starting-point of the railway survey is at the boundary between the Provinces of British Columbia and Alberta, the mile mileage reading westward.

At the time this section of the country was visited—September 27th, 1912—Mile 53 was the contractors' headquarters, rail-head being about half a mile farther west. From information obtained at Mile 53, it was found that all the important mica claims were then far above snow-line, the majority of them being at an altitude of over 8,000 feet. It was snowing on the mountain-tops and no one could be secured to act as guide to the claims, and, even if they could have been reached, they would have been covered with two or more feet of snow and nothing could have been seen.

Some information was obtained at Mile 53 from parties who had been over the mica properties, and it is believed to be fairly reliable.

A small creek named Sand creek flows from the west and empties into the Fraser river, one mile west of Tete Jaune Cache. This creek was visited and the sand was found to be exceedingly micaceous; in fact, all the surface wash of this section is highly impregnated with mica. Ascending Sand creek in a south-westerly direction, it was found that the creek had cut deeply through the surface wash, leaving precipitous banks, and, at seven miles from the Fraser river, flows through a rocky canyon, with the McLennan range and Mica mountain to the south.

At about 1,000 feet elevation above the creek, on the south side, some claims have been staked, but the mica is reported to be of poor quality.

Rising abruptly from Sand creek is the McLennan range, which is a high mountain-ridge running south-west and north-east, having peaks 8,500 feet high, or 5,500 feet above the Fraser river; a continuation of this range to the east is called Mica mountain. Some of the best mica showings are reported to be on this mountain at an altitude of 8,300 feet.

The claims have been located on a series of pegmatite dykes, from 10 to 30 feet wide, in which mica has been formed in small pockets. The *Sand Creek* and *Smith* groups of claims have been staked on these dykes and opened up by a few shots. Mica sheets 8 x 10 inches square have been taken out.

South-east of the McLennan range and one mile and a half distant is Nigger Head mountain, where twelve mica claims have been taken up on a pegmatite dyke, 30 feet wide and fairly well exposed by a series of open-cuts; plates 8 x 10 x 3 inches of clear museovite mica are reported to have been obtained. The altitude of the claim is over 8,000 feet.

A few miles south-east of Nigger Head mountain is Cranberry lake, in which Canoe river takes its rise, flowing south-east to the Columbia river. Occurrences of mica are reported from the headwaters of Canoe river.

Opposite the McLennan range and three miles north of Sand creek on a range of mountains, the *Kelly* group of mica claims has been recorded, but no information could be obtained about them.

It would appear that the pegmatite dykes referred to occur over a fairly wide area in this section of the Province, and now that the building of the Grand Trunk Pacific and Canadian Northern Railways has removed the most serious of the transportation problems, it is likely that an impetus will be given to prospecting for mica and that shipping mines will be recorded in the near future.

QUESNEL MINING DIVISION.

REPORT BY E. C. LUNN, MINING RECORDER.

I have the honour to submit herewith my report on mining operations in the Quesnel Mining Division of the Cariboo District for the year ending December 31st, 1912.

The revenue derived from mining shows a slight increase over that of last year, but, owing to most of the properties being in a state of development, there has been no large output.

Referring to the Quesnel Hydraulic Gold Mining Company, I notice that the report on this property has already been supplied by the Provincial Mineralogist in last year's Report, and, as it is a very full one, I am unable to add anything thereto.

The Morehead Mining Company, located on Morehead creek, with S. M. Pletch as manager, and Andrew Nesbitt as engineer, is putting in an hydraulic plant that will handle 4,000 yards of gravel a day. During the past season a tunnel has been run in on the channel with satisfactory results, allowing the installation of the above-mentioned plant. Material and supplies for the work of the coming season are now on the road, and operations will begin about April 15th. The Morehead Mining Company has its head office in Calgary, and the head office for the Province is at Quesnel Forks. Building will commence early in the year, and probably a crew of from twenty to thirty men will be employed for the entire season.

I am indebted to Thomas Graham for the following details of the Keithley Creek and Quesnel Forks section:—

The past year has witnessed a most encouraging revival of the mining industry. On the Quesnel river at Seven-mile creek the Water Tight Dipper Dredge and Mining Company, erected a camp and put in a sawmill, the first steps in the construction of the big dredge, and from information received I understand a considerable amount of work will be done this season.

On Spanish creek, a tributary of the North fork of the Quesnel river, John Hopp equipped a property formerly held by the Guggenheims, and hydraulicked with a crew of twenty men; it was late in the season before operations commenced, but the results were most encouraging. There seems to be a strong probability that this property will yield handsomely in the future. On Snowshoe creek the *Luce* hydraulic was operated with a crew of eight men with satisfactory results.

On Barr creek Mr. Hebson hydraulicked with a small crew.

On Marten creek Mr. Smith operated with a No. 2 Giant.

On Keithley, Goose, and Four-mile creeks considerable prospecting-work in gravels was accomplished.

The country drained by Keithley creek and its tributaries has not yet attracted the attention of capitalists. The gravels in this section are undoubtedly richer than those of the Quesnel River district, and should attract the attention of large operators when transportation is rendered easier.

LODE-MINING.

Interest in quartz-mining is being aroused. On *Yanks* ledge, on Snowshoe creek, Mr. Hebson and associates have a tunnel in 40 feet; this ledge averages in width 9 feet, and yields gold freely by panning.

Frank Cannon has driven 90 feet on his copper ledge on the Quesnel river, near Twenty-mile creek, and is reported to have an excellent showing of copper-ore in the face of the tunnel.

At the head of Quesnel lake some prospecting-work has been done on the *Big Galena* ledge, seventeen claims have been staked on this ledge; most of these have been bonded to the representatives of Chicago capitalists. One of the owners reports that one prospect-shaft "discloses a width of 20 feet of solid galena" (the writer feels some doubt as to the accuracy of this report, although it was made most emphatically). There is no doubt that the Quesnel Lake and Cariboo Lake regions are well worth the attention of the quartz prospector.

The Horsetly River Gold Dredge and Mining Company, head office in Vancouver, was hydraulicking at Harpers Camp for a short time at the close of the season, but the work was, to a great extent preparatory, so no great result was looked for. In all probability the coming season will see a considerable amount of work in this camp. From the foregoing facts it will readily be seen that, with the transportation facilities which are assured in the near future, the Quesnel Mining Division has great opportunities for the prospector.

OFFICE STATISTICS—QUESNEL MINING DIVISION.

Free miners' certificates.....	117
" " (company).....	1
" " (special).....	2
Certificates of work.....	2
Placer claims recorded.....	19
Mineral claims recorded.....	57
Bills of sale, transfers, etc.....	70

CASSIAR DISTRICT.

ATLIN MINING DIVISION.

REPORT OF J. A. FRASER, GOLD COMMISSIONER.

I have the honour to submit my report on mining operations in the Atlin Mining Division of Cassiar District for the year ending December 31st, 1912.

Although there were not quite as many people in the district as during the season of 1911, and the scarcity of water was even more marked than during that season, I am pleased to be able to report an increased output as well as an increase in the aggregate revenue collected throughout the district during the year 1912.

Had the water-supply been at all fair, or nearly adequate, there would undoubtedly have been a considerably greater increase in the amount of gold recovered, but the light snowfall of the previous year and the meagre rainfall during the summer left even such a reservoir as Surprise lake inadequate to supply the quantity required by the operators dependent upon it, and other sources of supply were in like manner found wanting.

Nothing was done this year towards increasing the water-supply by storage, or the diversion of outlying streams, and each dry season will doubtless provide its share of similarly disappointing experiences until some method of conservation, whereby increased supply can be assured, is adopted or provided.

McKEE CREEK.

On this creek the Pittsburg-British Gold Company, under the management of George Adams, commenced operations on May 18th, and, with a force varying from four to eighteen men (an average of thirteen), continued hydraulicking until October 20th, when the absolute failure of the water-supply compelled them to close down.

This company was handicapped by the great shortage of water and by repeated "sloughs" from high banks, of somewhat peculiar formation; but, notwithstanding all these, nearly 5,000 square yards of bed-rock was uncovered and a satisfactory amount of gold recovered therefrom; sufficient, at any rate, to show a more substantial balance of receipts over expenditure than had hitherto been shown, and to encourage the owners to expect greater and better returns next season.

Some prospecting was done on outlying portions of this company's holdings with a Keystone driller, but the results apparently did not disclose any new pay-streaks.

There were no individual mining operations on the creek.

PINE CREEK.

On Pine creek the North Columbia Gold Mining Company, under the management of J. M. Ruffner, operated hydraulically, as in the past two years, upon its own leasehold properties, and upon those of the Atlin Consolidated Mining Company adjacent on the north bank of the creek. With a force varying from forty-five to sixty-five men (an average of fifty-five), a large area of bed-rock, over 50,000 square yards, was uncovered with gratifying results, particularly on the north side, where the best returns ever realized here from this method of operations were obtained.

The general shortage of water affected even these operations, for, although Surprise lake, with its superficial area of nearly seventeen square miles, was the supply reservoir, it did not supply sufficient water to enable them to flush out the channel of Pine creek, and so dispose of a portion of the "tailings," as in former years; and still they closed down earlier than in previous seasons, practically for want of water. The period of operation extended over six months, and from twelve to fourteen large-sized monitors were used throughout the season.

A sad casualty occurred in connection with these operations in midsummer, when M. C. Radford, one of the foremen, was caught by a falling bank of gravel, and so seriously injured that he died a few days later. This accident was the more regrettable, because it appears to have been entirely due to his own temerity in continuing to pipe up against the bank after he had been warned to leave, and all the other men in the pit had done so.

The following is a statement of work done on these properties received from the manager, Mr. Ruffner:—

"In response to your request for information for your annual report, I beg to submit the following:—

"The North Columbia Gold Mining Company operated, as usual, its own ground through No. 1 pit, where two lines of pipe are installed, each being 30 inches in diameter at the upper end and tapering to 24 inches. There are five No. 6 monitors in the pit, each usually with a 7-inch nozzle; and on the dump, usually a No. 6 and a No. 4 machine. Here also is used a 5-foot flume and block riffles; the average amount of water, including the 'bank-head,' used was about 4,000 miners' inches. A small Sullivan air-compressor is very successfully utilized for operating three hand-stopping drills for drilling the largest boulders and the great amount of glacial clay encountered in this pit: this clay is in large 'slabs' and has to be reduced before being run through the sluices; these drills save a great amount of powder, which is an important item to be considered in mining in the Atlin District, as the White Pass and Yukon Railway Company's freight rate is excessive, not considering the original cost of the powder and the 1,000-mile ocean haul. The amount of material moved was 310,000 cubic yards and 16,525 square yards of bed-rock stripped; average depth of banks, 61 feet 6 inches. The possible running-time was 185 days and actual running-time was 151 days.

"No. 2 or A.C. Pit.—The same company operates this pit under lease from the Pine Creek Power Company, Limited, of its 'lay' agreement with the Atlin Consolidated Mining Company, a Guggenheim interest. Operations are carried on through two main lines of pipe, 30 and 28 inches respectively at their upper ends and tapering to 24 inches at pit. Usually four No. 6 and three No. 4 monitors are operated in the pit, and one No. 6 and two No. 4 machines are used stacking tailings and keeping open the tail-race. A 4½-foot flume with angle-iron riffles is used. Owing to the unusually 'flat' bed-rock many of the boulders have to be reduced, requiring a heavy consumption of 75-per-cent. dynamite. The amount of material moved during the season was 197,600 cubic yards; square yards stripped, 30,805, or 6.36 acres; average depth of banks, 19 feet 3 inches. Total production was \$72,440.95; average value per cubic yard, 36.7 cents; and per square yard of bed-rock, \$2.35. About 3,800 miners' inches of water was used. The possible running-time was 178 days and actual time 139 days. Both pits are equipped with a generator for lighting.

"Operations were considerably hampered by a general shortage in the water-supply. At no time during the season did the supply afford a flushing-head for the clearing of tailings from the creek-bed. This considerably reduced the duty of the miners' inch of water used in each pit.



Town of Telegraph Creek on Stikine River.



Abandoned Town of Glenora—Stikine River.

"The height of the water above the sill at the Surprise Lake dam at the close of the season of 1911 was 4 feet 10 inches, giving us this reserve amount with which to start operations this season, together with the small winter accumulation. At the close of this season it was 1 foot 11 inches. This will not afford us sufficient water with which to operate in both pits at the commencement of next season unless a winter thaw or early spring rains augment the supply.

"The number of men employed during the season ranged from forty-five to sixty-five, averaging about fifty-five."

The Pine Creek Flume Company, Limited, under the management of C. L. Queen, operated with a small force of men upon its lease holdings, adjacent to those operated by Mr. Ruffner on the north bank of Pine creek. He reports having erected nearly 1,200 feet of flume, built about 1,850 feet of ditch, and a dam 180 feet long, together with other dead-work. He operated a small hydraulic plant and moved about 6,000 cubic yards of gravel, securing the water therefor from Moose lake and some small lakes adjacent thereto.

Several individual miners operated on Pine creek, principally reshuicing old "tailings," and, while they did not report results, I have reason to believe they were quite satisfactory. About seventy men all told were engaged in mining operations on this creek.

SPRUCE CREEK.

On this creek about eighty men were engaged in mining during the season, with very good results.

The Spruce Creek Power Company, Limited, pursuing the policy adopted last year, did not operate this season, so that there was no hydraulic mining on this creek this year.

On the *Gladstone* lease James McCloskey pursued his drifting operations, with very satisfactory results. During the winter months a dump was put out, although open sluicing was carried on throughout the greater part of the winter as well. The average force employed comprised about twenty men, working day and night during the summer months. Over 12,000 cubic yards of gravel was thus removed and sluiced, from which over \$60,000 in gold was recovered. Considerable new plant was installed during the season, including 800 feet of water-supply flume, steel rails, cars, etc. Operations were suspended towards the end of October, and it is his intention to resume about May 1st, 1913.

On the *Poker* lease Isaac Matthews had a number of men employed on "lays," and the returns reported were very good indeed, considering the amount of dead-work which had to be performed before "pay" was encountered. A few men are working on this property this winter.

On the *Peterboro* lease drifting operations are being prosecuted by Messrs. Gould, Morse, *et al.*, but only dead-work has been done up to date; good results are confidently anticipated.

Individual mining was being carried on at various points along the creek, with indifferent results. A number of claims and one lease were relocated in the vicinity of Blue canyon, and an effort will be made next season to relocate the pay-streak which was being followed in the early days by the miners then on the creek.

J. M. Ruffner, by means of an Empire drill, disclosed the existence of a deep channel in the neighbourhood of the Columbia canyon, but his appliance did not enable him at that time to go deep enough to find bed-rock and ascertain what values, if any, are therein.

From thirty to forty men are drifting on this creek this winter.

BIRCH CREEK.

About the same number of men was engaged in mining on this creek this season as last—viz., from fourteen to seventeen—and with even better results than formerly while the water supply lasted; but, unfortunately, the shortage, so keenly felt throughout the district, was apparent on this creek also, and was primarily responsible for a slightly decreased output. During the early part of the season the plant, flumes, etc., were reinstalled, and by the middle of June were in very efficient working order, and a banner output was confidently expected; but the season, which is reported as “the dryest on record” on the creek, prevented the expected and desirable consummation.

As it was, however, over 52,000 square feet of bed-rock was cleaned by the hydraulic operations, and the yield therefrom was quite up to the best in past seasons.

The above operations were conducted as in former years, under the management of H. Peplow Pearse.

The individual operations on the upper portion of the creek did very well indeed while the water lasted, and had a successful season notwithstanding all handicaps.

There is nothing doing on this creek this winter.

BOULDER CREEK.

On this creek only about ten men were operating during the open season, and with possibly one exception they appeared satisfied with results.

The Société Minière de la Colombie Britannique does not appear to have recovered from the confusion created by the sudden death last year of its manager, T. Obalski. In any event, no one appears to have been appointed to succeed him.

There are at least seven men mining on this creek this winter.

RUBY CREEK.

The Placer Gold Mines Company, under the management of T. M. Daulton, continued the development-work commenced three years ago, which consisted principally in hydraulicking an open-cut or channel up-stream until bed-rock should be met on a working grade. Operations were commenced this season on April 8th, and continued with a force of from thirteen to seventeen men (an average of fourteen) until October 5th, during which period the open-cut was extended up-stream about 340 feet, with a width of 40 feet and an average depth of 45 feet until bed-rock (and “pay”) was encountered. About 65,000 cubic yards of gravel was handled, but were it not for the shortage of water, which was experienced through the whole season, the amount of material removed would doubtless have been much greater and the results correspondingly better.

As it was, the amount of gold recovered during the last two weeks' operation appears to have been very satisfactory and was an earnest of what may be expected from now on. The ground is undoubtedly rich, and this company can hardly fail to realize the reward due its perseverance and outlay.

WRIGHT CREEK.

From four to seven men were mining on this creek from May 3rd to October 10th, but owing to the scarcity of water not more than four men were working during the latter part of the season. Considerable dead-work was done and a bed-rock flume 960 feet long was installed, but the amount of gravel moved was not as great as in former years, nor were the returns encouraging. Still, with a persistence worthy of much better results and compensation, the owners intend pursuing the evanescent pay-streak which they confidently believe to be there, somewhere, during the coming season, and it is surely to be hoped they may find it.

OTTER CREEK.

On the upper portion of this creek J. E. Moran, with a force of four men, commenced operations on April 25th, but owing to the scarcity of water only three men were working during the latter part of the season. The returns were about the same as in former seasons in proportion to the amount of gravel moved, and over \$1 per square yard of bed-rock uncovered was secured. The banks were about 30 feet deep. Operations were closed down October 28th.

On the lower part of Otter creek the Maluin Syndicate, under the management of W. H. Brethour, continued the development-work commenced two years ago, and, with a considerable force, running from ten to thirty men, was engaged throughout the season installing pipe-lines and hydraulicing out a foundation for ditch and pipe-line and to reach bed-rock. During the season nearly 6,000 feet of new hydraulic pipe, running from 16 to 32 inches diameter, was installed at a cost of nearly \$16,000, and, altogether, an expenditure of about \$35,000 was reported in addition to that reported for previous seasons. This installation, when completed will be extensive and well equipped, and will doubtless give a good account of itself when mining is once more permanently undertaken.

WILSON CREEK.

Only a small number of men operated on this creek during the season, but, although the number was less than last season, the output was a little larger, indicating better returns for the labour expended. There does not appear to be anything doing on that creek this winter.

O'DONNELL RIVER.

On this stream Robert McKee, as manager for the Canadian-Alaska Exploration Company, continued sinking the shaft commenced last season, but, finding the inflow of water still greater than his pumps could cope with, notwithstanding the installation of larger pumps than were used last year, he abandoned that method and procured the use of a Keystone driller, with which he struck bed-rock at a depth of 94 feet from the surface and reported finding good values thereon.

As the depth to bed-rock was thus found to be much greater than was anticipated, operations were suspended early in the season to enable the manager to consult with his principals as to the best method of operation to be pursued under the altered conditions. Considerable excitement was occasioned in the fall and early winter by the reputed discovery on this stream of a rich pay-streak, situated on a bench at a height of from 30 to 50 feet above stream-level; but, although there were several stampedes to the place and considerable ground has been located, no new discovery of "pay," nor even a continuance of the original pay-streak, has been reported up to the date of this writing, so that it is difficult to determine what importance, if any, to attach to the matter.

I may say that some of the prospecting already done seems to have demonstrated the existence of two or three old channels (so called), which appear to contain "wash-gravel" and some gold, but whether in paying quantities or not has not yet been determined.

There are several small outfits prospecting in that vicinity this winter, and probably about twenty men are so engaged either on O'Donnell or its tributaries.

LINCOLN CREEK.

The parties holding the leases on this creek (under bond) commenced operations on April 13th with a force of seven men, and operated until July 30th, when, owing to the difficulty experienced in reaching bed-rock, it was determined to close down and to procure a Keystone

driller with which to continue prospecting next season, it being almost impracticable to transport such a piece of machinery to the creek economically except during winter, when it can be taken in over the snow and ice.

During the period of operation considerable engineering-work was performed in the way of procuring levels and water grades, cutting trails, and establishing good camp buildings.

A dam was also built and the creek diverted through a channel excavated 250 x 6 x 3 feet, and a tunnel was driven 120 feet up-stream and well timbered.

In June an Empire drill was procured, with which two holes were sunk, one 62 feet and the other 28 feet. In the former, although bed-rock was not reached, gold was "panned" from the last twelve feet. In the latter a stratum of clay was encountered through which the drill would not penetrate, hence the determination to procure a Keystone driller.

DAVENPORT CREEK.

On this creek which flows into Gladys Lake and through that system to Teslin lake, two or three men have been prospecting for over a year, and, while they have done a good deal of work tunnelling and sinking without striking bed-rock, they have found good coarse gold in considerable quantities, and are encouraged to continue. There appears to be a fair supply of water in the creek and good sluicing grades.

BURDETTE CREEK.

This is a tributary of O'Donnell river lying to the west of Wilson creek and running parallel with it. About midsummer a "discovery" was claimed and allowed on this creek, and a number of claims were located above and below "discovery," on some of which work was carried on until the end of September.

I have not learned that any phenomenal values were secured; next season better results may be hoped for. In October "discoveries" were claimed by and allowed to some Indians on four creeks, locally known as Silver, Trout, Johnson, and Mooshorn creeks, which lie to the south of and empty into White Swan river, which in turn empties into Teslin lake at its extreme southerly end.

The discoverers claim to have found gold from the "grass-roots" down, but do not pretend to have done much prospecting. Quite a number of Indians have located claims on those creeks, and apparently have done a fairly profitable business locating for and transferring to whites. A number of miners from Atlin and vicinity have gone out there, but at present writing no reports have been received from them.*

Some desultory prospecting was done on other streams throughout the district during the season, but nothing of importance has been reported, but a new impetus has been given to prospecting and further discoveries may be reported at any time.

MINERAL CLAIMS.

Still another season has passed without much active development having been done on mineral locations throughout the district, except upon the *Engineer* and *Ben McChree* groups, situated on Taku arm. More attention is being paid to procuring Crown grants for claims than formerly, which in itself is an evidence of confidence and progress.

*NOTE BY PROVINCIAL MINERALOGIST.—A private letter received from a prospector who had gone in to this "new find" from Telegraph Creek confirms the report as given to the Gold Commissioner—in that the Indians produced coarse gold which they claimed to have obtained here; that the Indians have staked on nearly every creek, and are holding their stakings for sale rather than to work them. This prospector is going in himself again in the spring, but says there is no one's statement—other than the Indians'—to justify any excitement, or, in fact, to guarantee that there is gold in paying quantities. It would be well to await this season's prospecting-work before forming any definite estimate of value of the Indians' stories.

On the *Engineer* group a force of about thirty men was employed during the summer by Captain James Alexander in surface prospecting, the results of which seem to prove the existence of a much larger area of richly mineralized ground than was formerly suspected, and, although I have not learned that much was done to prove values by sinking on the ledges, it was very apparent that the owners were much encouraged by the results obtained.

The small stamp-mill which is located on the property was kept in operation during the season also, and very good returns secured. I understand a shipment of high-grade ore was shipped to one of the Coast smelters, but I have not learned what the returns were.

On the *Ben M'Chree* group a force of from ten to nineteen men (an average of 16) was employed from April 15th to October 8th building roads and trails, erecting buildings, preparing the ground, and procuring the necessary timber for the installation of an aerial tramway, the machinery for which was landed at the mine early in the season.

A crew of men was also engaged throughout the season stripping and breaking out rock for sacking and shipping purposes, and it is claimed that a large quantity of very promising rock is thus ready for shipment as soon as the installation of the tramway is completed.

The above-mentioned operations were conducted under the general superintendence of O. H. Partridge, who, with the Hon. Maurice Egerton, represents the owners of the property.

Should the values prove up to expectation, the quantity of rock in sight appears to indicate the possession by these operators of a property capable of being developed into a mine.

Those gentlemen have also acquired title to a large number of claims on White Moose mountain, and have intimated that they intend prosecuting the active development of same this coming season.

Whilst those operators are actively prosecuting development, which entails heavy expense, they complain bitterly of the excessive cost of transportation of all kinds of supplies and material into the camp, stating that, whilst they were promised a reduction of 10 per cent. upon former rates by the White Pass & Yukon route, they have actually been charged an advance of 10 per cent. or more over last season's rates, which in themselves were considered almost prohibitory.

KLEHINI—RAINY HOLLOW.

I regret to report another season having passed without any material development or change in the situation in this part of the district, owing to the failure of the parties who were endeavouring to exploit it to accomplish anything material or satisfactory. Such development-work as was necessary to protect the titles was performed, but not much else; this applies to the quartz generally throughout the district. Much attention, however, has been directed to the Rainy Hollow section by would-be investors, and some better results may be hoped for in the near future, although, as stated in previous reports, no material change need be expected until some sort of rail communication with tide-water is provided.*

General.—Nothing has been done during the year towards developing the deposits of coal and hydro-magnesite located in the district.

*NOTE BY PROVINCIAL MINERALOGIST.—A description of the Rainy Hollow camp, written by Mr. Bryant, a mining engineer, and formerly in charge of Tye Copper Company mines on Vancouver Island, appeared in a recent issue of the *Mining Magazine*, published in London.

OFFICE STATISTICS—ATLIN MINING DIVISION.

Free miners' certificates (individual)	523
" " (companies)	7
" " (special)	2
Placer records	177
" re-records (representing 296 claims)	279
Leaves of absence (representing 222 claims)	82
Groupings	10
Permissions	2
Bills of sale (placer)	160
" (hydraulic)	47
" (mineral)	38
Mineral records	138
Certificates of work	130
Filings	11
Certificates of improvements	14
Crown grants issued	15
Certificates of improvements (advertised, not yet issued)	2
Gold reported (companies)—10,507 oz. Value	\$163,408 00
" (individuals) 5,701 " "	90,999 00
Totals	16,208 "
	\$254,407 00
Royalty paid by companies	3,017 10
" " individuals	1,579 20
Totals	\$4,596 30

Revenue collected during 1912.

Land sales	\$ 40 00
Water revenue (annual rentals)	834 10
Free miners' certificates (individuals)	2,283 50
" " (companies)	700 00
" " (special)	30 00
Mining receipts (lease rentals)	5,840 00
" (lease deposits)	1,240 00
" (other sources)	3,107 20
Leaves of absence	555 00
Licences (liquor)	655 00
" (trade)	165 00
Fines and forfeitures	1,289 05
Registry fees	4 00
Law-stamps	8 20
Revenue tax	669 00
"Taxation Act"—	
Real-property tax	3,155 20
Personal-property tax	16 45
Wild-land tax	23 55
Income-tax	21 55
Mineral-tax	4,596 30
Tax on unworked Crown-granted mineral claims	969 00
Interest	75
Total	\$26,202 85

STIKINE AND LIARD MINING DIVISIONS.

REPORT OF J. CARTMEL, GOLD COMMISSIONER.

I have the honour to submit the annual report on mining operations in the Stikine and Liard Mining Divisions of Cassiar District for the year ending December 31st, 1912.

There were more men employed in mining this season than last, and while, with the exception of the hydraulic on Thibert creek, no gold was reported as having been recovered from any of the operations, I believe some small amounts were obtained.

Quite a number of placer leases have been staked and applied for during the season, however, and, judging from the preparations which are being made to develop these, I consider the outlook for the coming season rather favourable.

PLACER.

On Thibert creek the Boulder Creek Mining Company constructed one and one-half miles of flume, 30 x 30 inches, connecting with their old flume from Berry creek of about the same length. This flume is calculated to carry 1,000 inches of water, and at the pressure-box gives a head of about 285 vertical feet. They commenced piping July 21st, and in spite of being hampered for a considerable time by lack of room while opening up the new pit, succeeded in moving a considerable quantity of gravel before ceasing operations about the middle of October. Notwithstanding the comparative shallowness of the ground, they were unfortunate in encountering a slide of mud and gravel (to which this ground seems peculiarly subject), which at the last moment partly filled the pit and covered one of the pipe-lines, forcing them to remove this pipe and the monitor it served, which was also endangered. This circumstance, happening just as they were about to clean up a large portion of the bed-rock which had taken considerable time to uncover, caused the temporary loss of all the gold thereon, and in consequence the season's output was much less than was expected. The results that were secured, however, were such as to warrant the prediction that barring accidents, this property will next season make far and away the best showing in its history. The conditions obtaining are practically ideal, the ground containing very few boulders and being easy to sluice, water plentiful, pressure adequate, and dump all that could be desired, the bed-rock of the old channel at the new workings being over 100 feet above the present creek-bed, and, if the precaution is taken to pipe off the overburden of loose material in the early part of the season, I see no necessity for any further trouble from the heretofore inevitable mud-slides.

A series of assays of the black sand concentrates, made on the ground by a competent assayer, showed good values in platinum, averaging, I believe, about 2 oz. of that metal per ton of concentrates, and if adequate measures are taken for saving the black sand a substantial addition to the output from this source would doubtless result.

On Little Deloire creek, a tributary of Thibert, no mining was done until late in the fall, when several leases were staked, and at least seven men are engaged in drifting there this winter.

On Mosquito creek, another tributary of Thibert, two men worked all summer with a "shooter" or automatic gate, but so far have been unable to reach bed-rock. They have, however, secured very encouraging prospects in the gravel, and if bed-rock proves to be proportionately richer, this creek should become an important producer.

On Dease creek a little desultory mining was done during the summer, and in some instances, I learn, good results, in proportion to the amount of work done, were obtained. On the *White Horse* lease, at the mouth of this creek, no work was done during the summer, as it

was proved last winter to be impossible to prospect the ground by means of shafts and pumps, owing to its proximity to and slight elevation above Dease lake. Negotiations were therefore entered into by the owner with some Eastern mining-men with a view to having the ground tested with a drill, and I am pleased to state that, as a result of these negotiations, an Empire drill was brought up the Stikine river late in the fall in charge of W. M. Ogilvie, who has had considerable experience with dredges in the Yukon. This drilling outfit has been taken in to Dease lake by dog-team, and, if the results of the operations justify it (which it is confidently expected they will), a large electric dredge will be installed on this ground in the near future.

Several creek and bench leases have also been staked near the mouth of Dease creek by J. A. Doffelmyer, who also came up the Stikine late in the season, and who states that the prospects he has been able to secure on the ground warrant his advocating to his principals the installation of a complete hydraulic plant on the property as soon as may be possible.

At this point it seems to me pertinent to point out the fact that unless some sort of road, at least suitable for winter use, is constructed from Telegraph Creek to the head of Dease lake, it will be almost an insuperable, or at least an excessively expensive, undertaking to transport heavy machinery of the kind above referred to in to Dease lake; and until some such road is constructed I feel constrained to say that in my opinion the known rich placer deposits of the Dease Lake and McDame Creek sections, and, in fact, the whole interior portion of the district, will receive but scant attention from capital.

On McDame creek very little work was done this season, and there are not more than five white men wintering there. Nothing, I regret to say, has been done on the *Radford* group of leases, owing to the untimely death of Mr. Radford last summer at Atlin. However, several new leases have been staked on the creek, and one at least of these new stakers has expressed his intention to bring in machinery next spring to work his ground.

MINERAL.

Quite a number more mineral claims have been located this year than last, but very little work has been recorded.

The Iskut Mining Company had its thirteen claims surveyed, which surveys were recorded as certificates of work, and the nine claims will doubtless now be Crown-granted, as they are entitled to be.

COAL.

Coal claims continue to be staked in that portion of the Groundhog section lying within this district, but, as there is practically no direct communication between Telegraph Creek and Groundhog, I am unable to say what developments are transpiring there. In any event, this will doubtless be fully covered by the report of the Provincial Mineralogist, who last summer visited that section, going in by way of Telegraph Creek.

OFFICE STATISTICS—STIKINE AND LIARD MINING DIVISIONS.

Revenue collected from free miners' certificates	§	478	75
" " mining receipts, general		2,384	40
" " other sources		2,767	69
Total		§	5,625 84



Camp of Boulder Creek Mining Co.—Thibert Creek.



Opening Hydraulic Pit, Boulder Creek Mining Co.

NOTES ON A TRIP TO DEASE LAKE AND TO THE GROUNDHOG COALFIELD.

BY WM. FLEET ROBERTSON, PROVINCIAL MINERALOGIST.

During the past year various reports had been received as to the existence of a very extensive coalfield lying immediately to the north of Groundhog mountain and occupying the height of land around the headwaters of the Skeena, Stikine, and Nass rivers.

The particulars of this coalfield, as far as they could be obtained from the preliminary reports of the locators and others, were fully set out in the Report of this Department for the year 1911.

The importance of a coalfield such as was predicted by these reports was of such moment to the development of the Province that the Provincial Mineralogist was instructed to visit the field during the summer of 1912 and to report upon the results actually obtained by development.

The route which had so far been used into the field was from Hazelton, but, as it was almost impossible, in July, to obtain horses at this point, it was decided that it was best to go in by way of Telegraph Creek, on the Stikine river, a supply-point about equally distant from the scene of operations.

The Provincial Mineralogist and party left Victoria on July 5th, travelling northward on the C.P.R. steamer "Princess Sophia," and arrived at Wrangell, Alaska, on the 9th.

Wrangell is a small town located on an island a few miles off the mouth of the Stikine river, and it is from here that all river-boats start to run up the river, which is navigable for this class of boat as far up as Telegraph Creek, a distance of approximately 180 miles.

The Stikine river is a very swift stream and rather difficult of navigation, except at certain limited periods of the season, when the depth of water is most favourable.

In addition to the difficulties met with on the river proper, the entrance into the river from the sea is greatly hindered by shoal water and a shifting channel, as, at the mouth, the river has formed a large delta, through which the water finds its way into the sea by various channels; these constantly shift their location over an area several miles in extent, and no one of the streams can be permanently used as the boat-channel.

It has been the custom of the Hudson Bay Company for years past to take each season, one of its river-steamers from the Skeena river while that river was in high water and to send it up to the Stikine to make a few trips to Telegraph Creek—usually in June—with possibly a couple of additional trips in the fall, for the convenience of big-game hunters going into the northern country.

The spasmodic trips of these steamers were the only means of transportation—except by canoe—afforded the northern country for many years past, and has undoubtedly been one reason for the retarded development of the district.

The conditions were so intolerable that, a couple of years ago, private parties in Wrangell and Telegraph Creek put on a small boat, run by a gasoline-engine, to carry freight and passengers.

In 1912 this small boat was replaced by a larger one propelled by twin tunnel-screws, driven by a pair of gasoline-engines. This boat, the "Nahlin," made a few trips in the early part of the season of 1912, but by July something happened to the engines and the boat was unable to get up as far as Telegraph Creek, although it made two trips as far up the river as the mouth of the Clearwater, where the cargoes were cached.

When the Provincial Mineralogist reached Wrangell, it was found that the Hudson's Bay steamer was off for the season, and that the gasolene-boat, the "Nahlin," had met with some mishap on the river, so that it was uncertain when she could be expected to return to Telegraph Creek. It was, consequently, found necessary to hire a locally owned gasolene-launch to make the trip. The launch engaged was the "Black Fox," a flat-bottomed boat about 30 feet long, propelled by a tunnel-screw, driven by a gasolene-engine. The boat was "home-made," designed after the model of the river-boats used for poling by hand—a model that proved to be extremely good for the service intended, in swift water, and having a speed of fifteen miles an hour.

Enough provisions were taken on at Wrangell to carry the party to Telegraph Creek, on which small amount of food the Canadian Customs collected duty, although it was impossible to buy food at any place, en route, in Canada.

July 11th. The party left Wrangell at 12 noon on July 11th, arriving at the "Alaska—British Columbia Boundary" at 7.30 p.m., and here the night had to be spent and the Customs regulations complied with.

The boat was too small to provide sleeping accommodations aboard and a camp ashore would have had to be made, but, through the courtesy of the Customs officer, the party was allowed to sleep on the floor of the Customs-house. The river so far traversed flowed smoothly by a number of channels, through a narrow valley bordered by steeply rising mountains that were covered by glaciers extending down to the river-level, producing wonderfully fine scenery, but no land fit for cultivation and very little timber of any importance.

The R.N.W. Mounted Police had at one time established a post at this boundary, and had built the several log buildings still standing and in use. This post had been supplied with horses, although there was no possibility of building trails leading anywhere; the horses had to be brought there and taken away by boat.

July 12th. At 6 a.m. Captain Kalkins had the party aboard and the boat under way, keeping up continuous travel until 8 p.m., some fourteen hours, in which time the river was ascended a distance of fifty-two miles, when camp was made at Kalkins's cabin, near the foot of Flood glacier. All meals were cooked on board over an oil-stove, while in motion. The boat averaged a speed through the water of at least twelve miles an hour, and the progress up-stream was a little less than four miles an hour, indicating a velocity of stream-current of at least eight miles an hour.

A large river (the Iskut) enters the Stikine from the east at a point a few miles above the boundary—its source being one hundred miles or so to the north-east, near the headwaters of the Nass.

For a number of years a good deal of prospecting has been going on on the watershed of the Iskut, from which very promising samples of copper and lead ores, carrying fair values in precious metals, have been obtained.

A number of these claims, held by Mr. Busby, of Canadian Customs, Mr. Bronson, of Wrangell, and associates, have had considerable work done on them and were, this past season, surveyed, preparatory to applications being made for Crown grants.

Apart from the mineral possibilities, the district passed through presents little of value; the river-valley is narrow, the mountains bare and precipitous and covered with glaciers which reach down in many places to the river-level, leaving little or, sometimes, no bottom land. There are a few small patches containing fair-sized timber, but the total area is unimportant.

Saturday, July 13th. After a night spent on the ground under a shed, the swarms of mosquitoes rendered an early start the next morning highly desirable, and the "Black Fox" was again under way at 4.10 a. m., headed up against the swift current, arriving at the mouth of the Scud river at 5.30 a. m., where a stop of some twenty minutes was made preparatory to entering a particularly swift part of the river.

On the east side of the river at this point, almost covered by a sandbar, lies the wreck of the Hudson Bay Company's steamer "Beaver," one of the numerous vessels plying on the Stikine in the days of the Cassiar gold excitement. Here the gasolene-power boat, the "Nahlin," passed down the river on her way to Wrangell, having been able to ascend the river only as far as the mouth of the Clearwater, where she had been obliged to cache her cargo.

At noon the "Little Canyon" was reached, through which the "Black Fox" made her way in the short time of twenty-five minutes. The canyon is a cleft in the granite rocks, in places not over 50 feet wide, with perpendicular walls towering from 100 to 300 feet above the water-level, most of the way, a distance of three-quarters of a mile.

Through this "sluiceway" the water rushes furiously, a deep stream and fortunately free from rocks or boulders. The current is so swift as to be quite unnavigable if it were not that a skilful pilot can take advantage of the various eddies and boils formed by the whirlpools that occur most of the way, rendering it extremely dangerous for canoes, as huge drift-logs are often sucked under in one place to come bobbing up again, on end, some distance below.

When several steamers navigated the river it was found necessary to maintain a signalman and semaphore near the middle of the canyon, so that two boats should not be in the canyon at the same time, as there is no room to pass.

The difficulties of ascending this canyon in a rowboat or canoe seemed unsurmountable, as the current is too swift for paddling, too deep for poling, while the perpendicular rock cliffs render tracking out of the question; yet it is frequently accomplished at all seasons by using boat-hooks and holding on by the fissures in the cliffs, which requires great skill and strength. Above the canyon for some miles the water is smooth, and possibly a little less swift than the average for the river.

The Kloochman canyon and Grand rapids were surmounted during the afternoon without much difficulty, thanks to the great power and seaworthy qualities of our little boat, the "Black Fox."

At about 8 p. m., nearly sixteen hours after starting from Kalkins's cabin, of which time about fourteen hours were occupied in continuous travel. Kirk's ranch on the east side of the river was reached. The distance travelled that day was about fifty-seven miles, which would indicate an adverse current of about nine miles an hour.

Kirk's ranch is about thirty-five miles below Telegraph Creek, and it was only a couple of miles below this point that any land suitable for agriculture was seen. The main river-valley had, until this point was reached, been flanked by steep rocky hills, leaving little bottom land; such land as there was being gravel-deposits with little surface soil.

Kirk has, however, a flat, estimated at 100 acres of very good silt soil, of which he has some 4 or 5 acres under cultivation, and grows, most successfully, potatoes, beets, turnips, and other root-crops, also cabbages, rhubarb, lettuce, etc., while hay, grain, and small fruits seem to do very well—the best evidence possible as to the suitability of the climate for agriculture.

Here the mountains of the Coast range were left behind and the interior plateau entered.

July 14th. By 5.15 the tent, which had to be put up the previous night, was down and the dunnage aboard the "Black Fox," and a start made for the remaining run of thirty-five miles to Telegraph Creek.

About 10 a.m. the deserted town of Glenora was reached, where fifteen or twenty houses marked the spot which had been for a time—about 1898—the head of navigation and administrative centre of the district, and from which point it had been expected the Cassiar Central Railway would start for the Northern Interior. A few miles of partly completed railway-grade marks the beginning of the work, which was, however, never continued.

A short distance below the old town is an old Hudson Bay Company's Post and the Cassiar Central Railway Company's storehouses, all of which were abandoned when the railway was discontinued, and at present there is not a single inhabitant in the old town, the portion of the population remaining in the country having moved up to Telegraph Creek, some twelve miles farther up-stream and at the present head of navigation.

Just above Glenora there are a couple of troublesome rapids, shallow and swift, which necessitated the party walking around, a distance of about three miles.

A wagon-road exists from Glenora to Telegraph Creek, a distance of twelve miles; this road does not follow the river, but had to be constructed some distance back to avoid the gulches and cliffs along the river-front.

Telegraph Creek was reached at 2.30 p.m. on the 14th, after a trip of 175 miles from Wrangell, occupying a little over three days' expired time, or forty-eight hours absolute running-time—a very creditable run for a boat of amateur home manufacture, and much faster than has been accomplished by any other than the large stern-wheel steamers. The round trip consumed about 250 gallons of gasoline, from which item alone it may be calculated that the trip is expensive. The usual fare up the river on the regular steamer is \$20 a head.

Telegraph Creek is a small town, although important in the district, consisting of a double row of houses and stores straggling along the river-front, built on a steep side-hill which has to be terraced for both roads and houses.

The resident white population will probably not exceed fifty persons, with about double as many civilized Indians and half-breeds, for the most part engaged, directly or indirectly, with the Indian trading of the Interior, carried on from this point by the Hudson Bay Company and Hyland & Belfry. Each of these firms has a store here, as well as a number of trading-posts on Dease lake and down the Liard river; there is also a small independent store run by an ex-Hudson Bay officer.

The town also contains two hotels, one run by each of the large trading firms—with only one liquor licence—a post-office, telegraph-office, church, and a cottage hospital, and is the seat of the Provincial Government Agent and Gold Commissioner.

In addition to Indian trading, the town is the supply-point for the few placer-mining operations in existence at the lower end of Dease lake, and it is the supply and starting point for hunting parties in quest of big game, for which the Cassiar District is world-famed.

As is the fate of all placer-gold mining camps, its glory soon fades, and in a short time its past history outshines its present performance. Such has been the fate of the Cassiar District. Early finds of placer gold caused a rush into the country in the early '70's, but within a few years the richer placers seem to have been worked out, until to-day there are only one company and some half-dozen individuals, or partnerships, carrying on active operations.

The intervening period of forty years has so obscured the knowledge of these early discoveries that it seems desirable to reproduce from the early reports of this Department some of the authoritative statements then made.

The Provincial Department of Mines was established under the "Minister of Mines Act, 1874," and the first report issued was for that year.

In July, 1874, the Gold Commissioner, Mr. Sullivan, reported from Laketon, where he was then already established, that "the present estimate of the mining population of this section is about 1,000 men"; and on October 14th of that year, he writes as to the "proper estimate of the amount of gold taken out of the Cassiar mines this year, I think the general computation to be about \$1,000,000 in value." From this it is evident the excitement was then well under way in 1874.

As to the date and origin of the discovery of gold in this district, the following may be quoted from the 1875 Report:—

"Fair prospects of gold had been from time to time discovered on the banks and bars of the Stikine river, and several parties had been formed for the purpose of visiting and endeavouring to establish that part of the Province as a goldfield. But no definite results followed the endeavours made in this direction from the seaboard; it was reserved for an explorer entering British Columbia through the portals of the Rocky mountains to discover this important tract of country, and it is to the intrepidity and perseverance of Mr. Thibert that attention is now called.

"Leaving Minnesota in June, 1869, with one companion and a small supply of necessaries, chiefly consisting of ammunition, Mr. Thibert started on a long and perilous journey, intending to pass two or three winters in trapping in the North-west Territory, and finally to penetrate through the Rocky mountains and British Columbia to the Pacific. They passed their first winter at Great Slave lake; during 1870 they resumed hunting and prospecting, and passed the winter about seventy-five miles up the Mackenzie river.

"During 1871 they passed through the Rocky mountains and wintered on the Ure or Deloire river at an old Hudson Bay fort; by this time their supplies had run very short, only a small supply of ammunition and tobacco remaining. In this dreary, solitary, and inhospitable region, they suffered tremendous hardships, being entirely dependent on their guns for the means of living.

"In the course of this year they met with another intrepid traveller, the well-known McCullough, who wintered with them. Up to this time they had heard or knew nothing about Dease river. By following the course of the Deloire river during 1872 they reached Dease Lake, where they parted with Mr. McCullough. The first gold struck by the party was in a place known as Devil's Portage, where the river crosses the Rocky mountains. On reaching Dease lake in 1872, they passed three weeks in fishing and hunting, and then proceeded down to the Stikine as far as Buck's Bar, McCullough proceeding to Victoria, while they wintered there; being the fourth year they had wintered alone, far from the habitation of man. On the 14th of February, 1873, they started for Dease lake, prospecting the creeks that empty into it, and shortly struck rich prospects, as much as 2 oz. of rough gold a day, on Thibert's creek, at a depth of from 1 to 3 feet, working with a rocker; the gold was found on slate bed-rock, in what in mining parlance is known as 'black rock.' Here they remained and worked three claims during the season. In July some more men, thirteen in all, arrived.

"Toward the fall some twenty men arrived, all wintering on Thibert's creek.

“Having left on a prospecting tour, they discovered paying ground on Dease creek, and William Moore started work there at Mr. Thibert's instance.

“Thibert's creek, as will be seen from the sketch map of Cassiar accompanying this Report, enters the lake close to the exit of Dease river. It is from twenty-five to thirty miles in length, and almost 50 feet wide, with occasional flats covered with deciduous trees.

“The most important work has been done on Rath's Bar or flat, about $1\frac{1}{2}$ miles up the creek.

“Tunnels have been started in the hillsides, and are being worked on the head of Thibert's creek, the results of which are not yet apparent.

“During the years 1874-5, prospecting was carried on in the vicinity of Dease creek in every direction, and up the Deloire river, resulting in the discovery of McDame's creek, Trout creek, Quartz creek, and Sayyee creek, all of which have been more or less successfully worked.

“During these years over 1,000 men have visited this locality; and although the season is very short, the estimate of gold produced is a little short of two millions of dollars.

“The area of the goldfield of Cassiar, thus far developed, comprises a tract of country of at least 300 miles square.

“It is almost impossible to forego the conclusion that for the discovery of this most important gold region the Province is almost entirely indebted to the intrepidity and perseverance of Mr. Thibert.”

The following table shows, in detail, the output of the district to date, as taken from the tabulated statistics contained in the reports of the Department, as being the amounts estimated by the Gold Commissioner as recovered during each year. From these figures it appears that the district has produced some \$4,896,730, or, in round figures, \$5,000,000 of gold to date.

In looking through the old reports, it was noted that the tabulated statements used in compilation of these figures vary, in a number of cases—between the years 1875 and 1880—from the output of that year as given by the Gold Commissioner in the body of his report, which latter figures were quoted by Dr. Dawson in the Canadian Geological Survey Report, 1887, p. 78B, which accounts for the difference in these two summaries.

The total difference in amount—up to the year 1887—shows the figures in the bodies of the reports to be \$569,774 higher than in the tabulated statistics; which is the nearer correct cannot be determined, but both are only estimates.

The following table illustrates the sudden rise and the gradual decadence of the gold yield of Cassiar :—

OUTPUT OF CASSIAR PLACER-GOLD FIELDS FROM EARLY REPORTS.

Year.	Dease Creek.	Thibert Creek.	McDame Creek.	Miscellaneous.	Total.
1873					} \$1,000,000
1874					
1875	\$350,000	\$150,000	\$300,000	\$ 31,920	831,920
1876	160,300	139,720	163,700		463,720
1877	81,300	173,700	92,130		347,130
1878	62,800	65,600	101,320	75,000	304,720
1879	56,000	71,000	113,200	165,000	343,200
1880	60,900	57,900	120,000	15,000	253,800
1881	37,500	28,100	100,000	33,300	198,900
1882	29,000	39,600	72,700	41,500	182,800
1883	14,000	29,000	65,000	11,000	119,000
1884	10,000	30,000	53,600	8,000	101,600
1885	12,350	12,600	19,000	6,650	50,600
1886	21,500	14,200	22,200	5,800	63,700
1887	18,430	10,000	23,775	3,000	55,205
1888	13,600	6,725	19,000	4,000	43,325
1889	11,200	10,800	28,410	4,500	54,910
*1890					
1891	20,000	20,000			40,000
1892	8,000	5,900	8,500	6,550	28,950
1893	5,900	3,809	8,776	4,450	22,935
1894	8,000	3,700	8,750	2,250	22,700
1895	8,050	3,700	9,650	1,175	22,575
1896					21,000
1897					37,060
1898					32,300
1899					19,380
1900					15,000
1901					22,800
1902					16,000
1903					35,000
1904					11,500
1905					25,000
1906					44,000
1907					25,000
1908					9,000
1909					9,000
1910					8,000
1911					6,000
1912					9,000
					\$4,896,730

*No returns were received for this year

Of late years the output has been made chiefly by the hydraulic companies working on Thibert creek, with a few individuals on Thibert and Dease creeks, very little work having been done of late in the McDame Creek section of the district. Even the Chinese, who had maintained a small production, have left, the last—some very old men—having been brought out this year by their countrymen on the Coast.

Arriving at Telegraph Creek on Sunday, July 14th, the 15th was spent in the purchase and packing of supplies and the arranging of camp outfit, preparatory to starting for the Dease Lake district.

July 16th was spent in Telegraph Creek waiting for the pack-train which had been delayed a day on the trail by wet weather.

July 17th the party left Telegraph Creek at 11 a.m. with nine horses and an Indian packer, camping that night at the bridge across the Tahltan river, near its junction with the Stikine and a mile above the Indian village of Tahltan, which is the headquarters for most of the Indians in the district.

From Telegraph Creek, at an altitude of 540 feet, the trail rises by a series of switchbacks to a bench some 300 feet higher, composed of glacial gravel, flanked to the north-west by hills of volcanic rocks—basalts, lava, etc.—which formation is in evidence as far as the Tuya river, forming the Great Canyon of the Stikine river, which renders the river quite unnavigable and forces the trail on to the hillsides, among precipitous cliffs, at an elevation of about 1,000 feet.

In this volcanic formation there is no area that could be used for agriculture, save a few depressions and isolated patches near the river where some soil has been deposited; no timber of commercial value was seen along the line of the trail.

The basalt cliffs forming the sides of the canyon are—at the mouth of the Tahltan from 200 to 300 feet high—perpendicular in most places and evidencing successive flows of lava, apparently coming from an easterly direction, frequently overlying beds of gravel, apparently of pre-glacial age, in the channels of old rivers. Photographs of these basalt flows accompany this report, and reproductions have been made from Dr. G. M. Dawson's sketches of them, as given in the Geological Survey Report, 1887-8, p. 71B.

The following are Dr. Dawson's geological notes along the trail from Telegraph Creek to Dease lake, from the same report:—

“Respecting the older rocks which characterize the greater part of the country between Telegraph Creek and Dease lake, few details were noted, and no approach to a general section was obtained, as they are not usually exposed except along the bases of the mountains, which are, as a rule, at some distance from the route of travel. They may be described as consisting of grey and greenish-grey quartzites and grauwackes, with a large proportion of altered volcanic materials, generally feldspathic, but passing into diabases and becoming in some cases more or less schistose. Rocks originally of volcanic origin notably preponderate in the vicinity of Telegraph Creek, while near Dease lake they are less abundant, and at about two miles from the lake, on the trail, massive grey fine-grained limestone occurs, in exposures which are nearly continuous for about a mile. None of the mountains in sight on either side of the valley are distinctly granitic, and rocks of this character were observed only in one locality, where they occupy a relatively small area.

“At about two miles along the trail to the south-west of the Tahltan, a dark, blackish-green, highly crystalline hornblende rock occurs in considerable mass, and is much broken and shattered by a grey porphyritic and hornblende granite, which appears to be of later date, and which may have a width of about two miles on the trail. In the bed of the Tooya river, rocks differing in appearance from any seen elsewhere on this trail were found. They are reddish and purplish in colour, fine-grained, and in some beds slightly porphyritic, and appear to be chiefly feldspathic in composition. One of these is identical with a rock met with in the lower part of the bedded series, a short distance above ‘Grand Rapid,’ on the Stikine. No fossils were found in the limestones above alluded to, and the rocks, as a whole, can at present only be classed as Paleozoic, though showing many points in common with those of the C ache Creek group of southern British Columbia, which is believed to be, in great part at least, of Carboniferous age.

“The pre-glacial age of the basaltic rocks is shown, as already noted, by their relation to the terraces of the valley, and also by the occurrence upon them of large granitic boulders, the transport of which must be attributed to glacial action. This is seen particularly in some places between Telegraph Creek and the Tahltan. The basaltic rocks, at the period of their eruption, have filled the old river-valley, and may very probably have at one time done so continuously from below Glenora to the Tooya, or perhaps considerably farther. There is no



Junction of Stikine and Tahltan Rivers.



Swimming Pack-train across Stikine at Telegraph Creek.

reason to suppose that the basalts were erupted from a single volcanic centre, and indeed the existence of basaltic dykes cutting the older rocks at Telegraph Creek would appear to lead to an opposite conclusion. Subsequent to the period of basaltic eruption, the river, still flowing in the same great valley, has cut down through the basalts in several places, exposing sections of the gravel-deposits of the ancient river. The new channel thus formed is not, however,

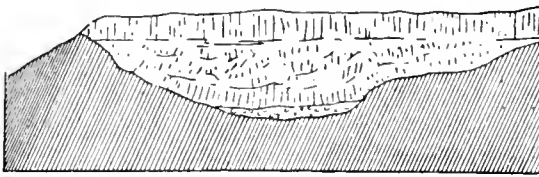


FIG. 3.—SECTION SHOWING OLD RIVER-CHANNEL CAPPED BY BASALTS. EAST BANK STIKINE RIVER BELOW TAHL-TAN.

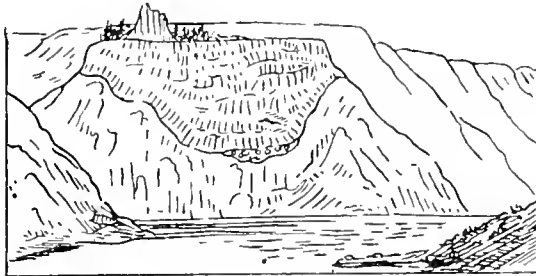


FIG. 4.—SECTION SHOWING OLD RIVER-CHANNEL FILLED WITH BASALT. MOUTH OF TAHL-TAN.

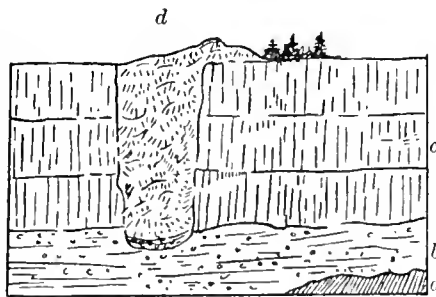


FIG. 5.—SECTION SHOWING RELATIONS OF BASALTS AND GRAVELS. STIKINE RIVER, EAST BANK, ABOVE TAHL-TAN.

- a.* Old basal rocks.
- b.* Old gravels.
- c.* Superposed basalt flows.
- d.* Basaltic filling of a later gorge.

coincident with the old, but cuts across it at several points, and above Telegraph Creek the excavation of the new bed has been carried to a depth estimated at from 40 to 70 feet below the earlier one.

“A few miles below Glenora, where the basalt filling of the old valley has been cut across, it seems, however, that the old river-bed is below the present water-level, indicating, in connection with the previous observation, that the grade of the original river was greater than that of the present.

“Directly opposite the mouth of the Tahltan river, on the left bank of the Stikine, a good section of the old river-bed is exposed, in the truncated end of a point which forms a spur of the plateau to the south, the basalts filling it like a great ingot and resting, at the bottom, on the old gravels, at the sides, directly on the rocky banks of the old channel.

“The angle between the Tahltan and the Stikine, on the upper side, has already been referred to in connection with the peculiarly disturbed character of the basalt layer by which it is capped. Beneath the basalt at this place is a great thickness (apparently not much less than 100 feet) of well-rounded gravel and boulders. It is probable that this deposit does not reach to the water-level, but its disintegrated material has formed a slope which conceals any basis of old rocks which may be beneath it. The eruption of basalt has, moreover, not been confined to a single period, but must have occurred at several different times separated by rather wide intervals. The occurrence in some places of three or more superposed flows shows this to have been the case, but a still more striking proof of the same fact is found in a section observed from a distance, on the left bank of the Stikine above the Tahltan. At this place a thick and apparently extensive deposit of gravels has been covered by three superposed basaltic flows. Through these, a narrow vertical-sided canyon has been cut by some tributary stream, which has even excavated a portion of the gravels beneath the lowest basalt. A fourth basaltic flow has then occurred, which has completely filled the canyon and partly overflowed on the surface of the highest of the three earlier basaltic layers.

“Though the basalts of Tertiary age actually seen by me are confined to the Stikine valley, it is highly probable that further explorations will prove their occurrence in other valleys, and possibly also the existence of similar rocks, in the form of plateaux of some size, in the region east of the Coast ranges.

“The basaltic formation of this part of the Stikine has been described in some detail, on account of the importance which it possesses in respect to the distribution of gold. The gold along the Stikine was said by the miners to be ‘spotted,’ or irregular, in its occurrence, but the greater part of the ‘heavy’ gold was found just along that portion of the stream now characterized by the basalts, and it appears even possible to trace a connection between the richer bars which have been worked and those places in which the present river has cut through or followed the old basalt-protected channel. This being the case, it seems very desirable that the old channel should be fully prospected, which I cannot learn has ever been attempted. If gold should be found in it in paying quantity, it might easily be worked, and would give rise to a considerable renewal of activity in mining. It is not known to what extent similar conditions may occur up the Tahltan valley, where also remunerative bars were worked some years ago.”

At the mouth of the Tahltan quite a number of Indians were found drying salmon; these fish apparently come up the Stikine in large numbers; the greater part of the run is reported to go up the Scud tributary, but a large number get up to the mouth of the Tahltan, and farther up the Stikine, as far as the mouth of the Tuya; further progress is, however, blocked by falls, etc., in these rivers.

July 18th. From the Tahltan bridge the trail mounts rapidly to the top of a basalt bench, 400 feet high, between the Tahltan and the Stikine rivers, along which it was followed for a couple of miles over the bare basalt blocks, dropping again to the level of the river at Ward's, a ranch on a piece of interval land on the bank of the Stikine.

At Ward's a considerable acreage was under cultivation, very successfully, good crops of hay, oats, and the ordinary vegetables being seen; irrigation is, however, required, the water being obtained from a small creek.

From Ward's the trail climbs to a plateau, about 1,000 feet higher, along which it runs for about five miles, on very even ground well suited for agriculture, only to drop 1,000 feet again, by a steep zigzag trail, into the valley of the Tuya river, which was crossed on a bridge—now very much in need of renewal—when another climb of 1,000 feet had to be made by another zigzag trail out out of a clay hillside—quite safe in dry weather, but impossible for horses in wet weather.

About three miles after crossing the Tuya, Wilson's ranch was reached, a piece of wild hay meadow, from which a crop of hay is obtained without any assistance to nature.

At Wilson's the main trail was left, an Indian branch trail, or switch trail, being followed to a small lake to the south, where feed for the horses was found, no feed being obtainable on this part of the main trail.

The distance travelled this day was only ten miles, but the effort caused by the Ward and Tuya hills, combined with exceptionally hot weather, constituted a full day's work for horses and men, while the clouds of mosquitoes at the camping-place did not make for rest or sleep.

Coal has been found in thick seams on the Tuya river about 25 miles up from its mouth, according to the report of R. D. Featherstonhaugh (published in the Report of this Department for 1904, p.p. 97, 98), from which it appears that the coal is a lignite, but, from the analyses of samples submitted to this Department, it is a lignite of exceedingly good quality, and may eventually be found of commercial importance to the district.

July 19th proved to be a fine morning and an early start was attempted, to be frustrated by a couple of the pack-horses which had strayed from the bunch. The pack-train was, however, in motion by 7.30, and at 1.30 Caribou camp was reached, after travelling for seventeen miles along a plateau, at an elevation of 2,000 feet, on a trail good enough for a wagon-road, but the day was so hot that man and beast nearly collapsed.

July 20th. In anticipation of another hot day, the camp was broken up by 4 a.m., and the pack-train on the way by 6.20, arriving at Beaver camp, on the Tanzilla river, some twenty miles from Dease lake, at 12.15, after travelling seventeen miles over a very good and comparatively even trail, which, at a very small cost, could be made into a wagon-road.

The extremely hot weather of the previous day proved to be the precursor of a heavy thunderstorm which broke at 9 a.m. and lasted for an hour, rendering travel much more pleasant.

July 21st.—Camp was moved from Beaver camp to eight miles from Dease lake, a distance of twelve miles.

July 22nd. The writer's pack-train arrived at Dease lake about 11 a.m., where Mr. Smith, Hyland & Belfry's agent at Porter's Landing, was found awaiting the party with a 30-foot scow manned by an Indian and a Chinaman; but, as the pack-train with cargo for the lower posts had not arrived, the scow could not start. It took until 4 p.m. to get this freight on board, and during this time a headwind had sprung up, so that three hours' hard rowing only propelled the scow down the lake about three miles, when camp had to be made on the east shore of the lake. The pack-train was left at the head of the lake in charge of the cook, John McDonald, and the Indian packer, Lewdecker.

The length of the trail was estimated, as stated, at about seventy-seven miles. A party of surveyors under F. Casey was at work on the trail, surveying its length for the Provincial Government for the purpose of laying out a wagon-road, or rather, of so altering the trail-location that it might eventually be converted into a wagon-road. By this actual survey the amended road would be 75.2 miles in length, and quite feasible to build at a reasonable cost.

The necessity of this road is urged to open up the district and to admit of supplies for the existing mining operations and for prospecting of really promising localities, being brought in at rates which would not be nearly as prohibitive as at present.

It is of interest to read the late Dr. G. M. Dawson's description of the route of the proposed wagon-road, as given by him in the 1887 Report of the Geological Survey, as the conditions and requirements do not seem to have changed in the intervening twenty-five years. The following is Dr. Dawson's description :—

“Dease lake is the central point of the Cassiar District, and though, as shown by statistics subsequently quoted, the yield of gold has greatly fallen off since the palmy days of its first discovery, it is very probable that further placer mines of value may yet be found in this region (of which a great part still remains to be carefully prospected), and there is every reason to believe that quartz-mining and other industries will before long be developed on a considerable scale. Even at the present moment this district is more easily accessible than that of Cariboo, and when a wagon-road shall have been built from the head of navigation on the Stikine to Dease lake, it should be easy to lay down goods at the latter point at very reasonable rates.

“The construction of a wagon-road, with moderately favourable grades, between Telegraph Creek and Dease lake would not be very difficult or expensive. The first ascent from Telegraph Creek is steep, but might easily be overcome. Between eight and ten miles from Telegraph Creek, or for a distance of about two miles, the road would have to follow a rough hillside, above the canyon, where some blasting and grading would be required. The descent to the Tahltan would entail some heavy side-hill cutting in rock and earth and a bridge would be necessary. The ascent and crossing of the ‘lava-bed’ would entail about a mile of rough work on the opposite side of the Tahltan, and should the line of the present trail be followed, a long and steep ascent, with grading in gravel and clay, would be required at Ward's, and again in descending to and ascending from the Tooya valley, but no rock-work would be necessary. It seems quite probable, however, that a better route might be found for a road, at a lower level, from Ward's to the mouth of the Tooya, in following along the side of the main valley. In either case a good bridge would be required at the Tooya. Beyond this, all the way to Dease lake, no further serious obstacle is met with. Portions of the route are clayey and swampy, and to render these easily passable, from eight to ten miles of corduroy in all would be required, for which suitable material could be obtained near by in all cases.

“Should the construction of a railway be contemplated, the difficulties to be surmounted would be greater in proportion, particularly between Telegraph Creek and the Tahltan, where the line would have to follow the side of the canyon, which is very rough and rocky. Beyond this point, so far as the valley could be seen from the trail, it presents no very serious impediments. Below Telegraph Creek, to Glenora, or a little farther, a railway would involve some moderately heavy side-hill work; but farther down the Stikine, to the sea, it might follow the river-flats at a nearly uniform level. The greatest difficulty to be apprehended on this part of the line would be that likely to arise in winter from the very heavy snowfall on that part of the river below the Little Canyon.



Old Working-pit, Herry Creek Mining Co.—Thibert Creek.

“It may be pointed out in this connection that the survey of the Stikine and of the valley leading by the Tanzilla to Dease lake shows that the route is an exceedingly direct one to Dease lake, and that, taken in conjunction with the valleys of the Dease and Liard rivers, it affords almost an air-line from the Pacific coast to the great Mackenzie river.

“The present rates for goods from Wrangell to Dease lake are about as follows: Wrangell to Telegraph Creek by steamer, $2\frac{1}{2}$ cents per pound; thence to Dease lake by pack animals, 6 cents; thence by lake to Laketon, $\frac{3}{4}$ to 1 cent.: total, about $9\frac{1}{2}$ cents per pound, or \$195 per ton. The result of such high prices is to discourage prospecting in the district and seriously to retard its further development.”

The time at present occupied by a pack-train from Telegraph Creek to Dease lake is ten days for the round trip—six days going in loaded and four days returning light; the packing season is from June to October.

July 23rd. It was hoped, by making an early start, to get the scow down the lake before the wind of the daytime should spring up, so camp was broken and the party under way by 6 a.m., but after two hours' hard work, of both crew and passengers, only about two miles was made, and it became necessary to wait behind a sheltering point of land until the wind subsided. At 8 p.m. the headwind having slackened, a start was again made, and at 2 a.m., after six hours' steady rowing, the old townsite of Laketon was reached, and the party camped in an old warehouse, a relic of the palmy days long past.

July 24th. The morning was spent at Laketon, leaving in the afternoon for Porter's Landing, at the lower end of the lake, which was reached about 5 p.m. At 7 p.m. the writer and his assistant started to walk the eight miles to the camp of the Boulder Creek Mining Company, on Thibert creek, where the manager, Warburton Pike, hospitably provided for the party.

The Boulder Creek Mining Company is the natural successor of the **Boulder Creek Mining Company**, Thibert Creek Mining Company, and later of the **Berry Creek Mining Company**. Company, having succeeded to the leases and water rights of these companies.

The active operations of the Thibert Creek Mining Company were begun in 1900, under the charge of Alexander Hamfield, practically the whole of that season being spent in getting the hydraulic plant on the ground and making ready to start the next season. In 1901 two pits were opened on the high, or old river, channel of Thibert creek, at the mouth of Berry creek. This old channel is traceable for some miles above, and also below, Berry creek, on the right bank of Thibert, at a height of from 50 to 100 feet above the present river-channel.

The equipment and history of the operation of this plant are given in the Reports of this Department for 1901, 1902, and 1903. By 1904 it had become apparent that, under the conditions of working, although a fair amount of gold was recovered—somewhere about \$80,000—the plant could not be run at a profit with the amount of water available, about 450 miners' inches, consequently, in the early part of 1904, Mr. Hamfield, originally the manager and later the lessor of the Thibert Creek Company's properties, with certain associates, formed a new company, the **Berry Creek Mining Company**, to take over the Thibert Creek Company's leases and rights.

Under this reorganization, it was arranged to increase the water-supply to 1,000 miners' inches, which was done, the water being eventually gathered from upper Dease and French creeks and turned into Berry creek to augment the supply from that creek.

The operations of this Company were continued during the years 1904, 1905, 1906, and 1907, during which time the ground was found to run from 10 to 20 cents a cubic yard, and good profits from the operations seemed certain each year, only to be wiped out by mud-slides, which repeatedly buried the hydraulic pit.

This old pit has now been abandoned owing to these slides. It was opened up for a length of about 1,100 feet along Thibert creek, with a width in places of 250 feet, the dirt-face being, at the highest point, about 200 feet above the pit, from the top of which the hill continued to rise for many hundreds of feet higher, at a slope of about 20 degrees, being chiefly composed of clay, with no solid rim-rock in sight; it was really the repeated sliding of this hillside into the pit that necessitated its final abandonment. The bed-rock is a shale or slate on edge, cut by a number of soft white dykes. The deposit next to the bed-rock is a coarse gravel, composed of granite, greenstone, jasper, porphyry, and a dark-blue rock, with very few large boulders.

The gold is fairly coarse and flat and is valued at about \$16 an ounce. The dump was into Thibert creek, about 30 feet lower than the bed-rock of the hydraulic pit.

The water-supply is from Berry creek—augmented as previously described—and is brought in from a pooling reservoir, formed by a small dam on the creek, by one and a half miles of flume to the pressure-box of the old pit.

The present holder of the property is the Boulder Creek Mining Company, an English company, which has leased the property for four years with an option of purchase.

This company has taken over the whole of the ten leases and plant, and was engaged during the summer of 1912 in opening up a new pit, 1,000 feet below the mouth of Boulder creek and about one and a half miles below the old pit, on the same side of the river, to which point the flume has been extended. The water was turned through it by the middle of June.

Work was immediately begun on opening up a pit on the same old, or high, channel previously worked, and where in the early days of the camp successful surface operations had been carried on.

This pit is about 75 feet above Thibert creek, with fragments of what appears to be rim-rock between it and the creek, while to the inner side there is also outcropping a ridge of what appears to be the other rim-rock, and which, if such proves to be the case, should effectively guard this new pit from such troubles as were encountered in the old pit.

The opening-up work was being carried on with one 5-inch monitor under a hydraulic head of 300 feet. By the end of July the work had only begun to get into proper shape, and it is doubtful if it will have advanced far enough to permit of any satisfactory "clean-up" this year.

A mining engineer, who was on the ground for an English company during the opening up of the pit, is reported by the manager to have taken a sectional sample down the face of the bank, amounting to 100 cubic yards of gravel, which was subsequently hand-sluiced and yielded \$68 in gold, equivalent to 68 cents a cubic yard. While it is not expected that the whole deposit will be up to this sample, the result was certainly very encouraging.

As has been mentioned in the former reports, crude platinum is found associated with the gold in this deposit, and as soon as matters can be adjusted an arrangement will be established for the commercial separation of platinum as a by-product.

From the results obtained in former years in the working of this same high channel at the old pit, it would seem that the new pit, offering as it does, so many features tending to cheaper and safer working, has every prospect of turning out a commercial success.

As has already been noticed, the high channel of the creek is traceable **Other Companies** for some distance above and below the holdings of the Boulder Creek **on Thibert Creek**. Company. This channel at some distance above Berry creek, appears to cut into the hill, coming out on Berry creek just above its junction with

Thibert creek; where the channel leaves Thibert creek it has recently been prospected by several drifts, in which results are reported to have been obtained, which justify more extended operations. During the 1912 season no work was done here.

On Little Deloire creek, a tributary of Thibert, entering it from the south, about two and a half miles up from Dease lake, the Mitchell Bros. have been at work for some years, and have made at least a partially successful season.

They formerly had sunk a shaft 28 feet in the rim-rock and then drifted out into the channel, where they report to have found good gold values; they had difficulty, however, in holding the roof and were eventually flooded out.

In 1912 they were engaged in "booming" the old bed of the creek by accumulating the water in a reservoir, from which, by a most ingenious device, it was automatically discharged in a rush whenever the reservoir became full. About 1,700 feet of the creek had been sluiced, but it was not learned how much gold had been cleaned up.

It was reported that a miner named Bush had been at work a mile higher up the creek, and another named Dickson two miles up, at the end of the canyon, and that they had both struck coarse gold. Neither of these men were, however, at work when the creek was visited.

The output of gold formerly made from Dease, and other creeks, has already been given in tabular form and from this it will be seen that the mining operations in the early days were both extensive and profitable.

According to the old records, the bed of Thibert creek paid, before it was worked out, for a distance of about 6 miles from its mouth, yielding, when at its best, from \$8 to \$50 a day to the hand.

McDAME CREEK DISTRICT.

At the present time it could not be learned that any one is mining in the McDame Creek section, even the Chinese having left.

The operations of the Rosella Mining Company on Rosella creek came to a halt upon the sudden death some years ago of J. H. Haskins, the then manager and moving spirit in the company, since when nothing has been done with the hydraulic plant which has been brought on to the ground but never erected.

July 28th was spent at Porter's Landing, to which a return had been made the previous evening, no boat being available that day to go up the lake.

Porter's Landing now consists of a Hudson Bay Company's store and one run by Hyland & Belfry, each in charge of a white man, who, with the addition of a few Indians and half-breeds, constitute the resident population of the once rather lively town. Its present importance is chiefly as the supply-point for the Hydraulic Company on Thibert creek, and the starting-point and headquarters for the scows and crews of Indians engaged in summer in transporting supplies for the two trading companies to their posts on the Liard river.

July 29th. The writer and a number of others left Porter's Landing at 10 a.m. on Sunday for the upper end of the lake in Hyland & Belfry's scow. A couple of hours were spent in Laketon, and the upper end of the lake was eventually reached at 9 a.m. July 30th.

The old town of Laketon is now deserted, its sole resident population consisting of an Indian packer and his family, with one white prospector, who uses one of the old Government buildings as his headquarters, and a couple of miners who have cabins a short distance up Dease creek.

DEASE CREEK.

According to Dr. G. M. Dawson, who visited the creek in 1887, the bed of Dease creek was then nearly worked out, having been gone over several times; it paid well, from \$8 to \$50 a day to the hand, for a distance of six miles up from the flats, with a few good isolated claims higher up.

In 1912 there were two men working on the creek; Ryan was working a claim on the north side of the creek immediately above the canyon at the head of the flats and about half a mile from the lake, where he was running a tunnel from the creek-level into what appears to be a slide from the hillside at a point where the old, or high, channel cuts into the hill, coming out on the flats lying to the north of the present creek.

The tunnel-workings exhibit quite a number of large rounded boulders, with some gravel-wash, but there is also a large percentage of angular rock fragments, not water-worn and clay.

A sample of the iron-sulphides obtained by Ryan in his sluice-boxes was taken for assay, and was found to contain 4.8 oz. of gold—about \$96—to the ton. The sample was afterwards tested for platinum, but none could be detected, although this metal is known to exist in the next creek—Thibert creek.

Ryan was making wages, although probably not very much more; the gold was fairly coarse and flat.

A miner named Johnson was said to be working in a small way some six miles up the creek, but as it was reported that he was not having any great success, his claims were not visited.

On the flats about a quarter of a mile from the lake and immediately below the gorge by which the creek enters the flats, Messrs. Hyland and Fowler have a lease on which they have sunk a shaft down to a depth of 29 feet, without reaching bed-rock. The property was worked in 1911, and an attempt was made to handle the water with an old steam plant, but without success, and they were forced to abandon this shaft, and are preparing to sink another where it is expected that the flow of water will not be so great.

It is reported that gold in fair quantity was found at 18 feet down, but no work was done on that streak other than the sinking of the shaft through it. The wash from this shaft also contained much slide-matter among the gravel and a few large boulders.

It seemed to the writer as if the old high channel, which had been found on one side or other of the creek coming down the valley, had, at the canyon referred to, cut into the hillside to the north of the present creek and continued towards the lake through the low bench land lying to the north of the flats, and that it is quite possible that these benches may still be found to be worth prospecting.

The present stream had cut through the rim-rock to the south, forming the canyon and emptying over the flats into the lake, which probably then stood at a much higher level than at present.

July 30th. The scow with the party aboard arrived at the head of the lake about 9 a.m.; the pack-train had to be gathered together, and the return by trail to Telegraph Creek started at 2.30 p.m., fifteen miles being travelled before camp was made. Telegraph Creek was reached on August 2nd.

August 3rd to 5th was spent at Telegraph Creek waiting till the Hyland pack-train returned with the additional horses and men required for the long journey to the Groundhog coalfield.



Laketon—on Dense Lake—Laird Mining Division.



Ryan's—Placer Drift-mine—Dense Creek, near Laketon.

QUARTZ-MINING.

With the exception of the claims already mentioned which are being prospected on the Iskut river, there is no "quartz-mining" being done in the district: in fact, with the present lack of transportation facilities there is no incentive to prospect for lode mines.

In the days of the Cassiar Central Railway's explorations, about 1897, a number of mineral claims were located near the Dease river, but these were never developed. Various parties have brought in samples of copper-ore and argentiferous galena of such character as to give hope that prospecting would develop these minerals in such quantities as might justify mining when railway facilities are provided, but so far no definite information is available.

TRIP FROM TELEGRAPH CREEK TO GROUNDHOG.

It was found that it would be impracticable to take horses from Telegraph Creek through the Groundhog to Hazelton and ensure their return to the former place before winter set in, the round trip being some 600 miles, with high summits to pass. So it was arranged that the Telegraph Creek pack-train should take the writer and party as far as Groundhog mountain, returning light to Telegraph Creek. After looking over the coalfield the Provincial Mineralogist would be taken out to Hazelton by a Hazelton pack-train that was bringing in supplies to the coalfield and returning light to Hazelton.

August 6th. The party left Telegraph Creek on the afternoon of August 6th, the horses having been swum across the Stikine river in the morning, there being no bridge or ferry, one of which is sadly needed, as the river is very dangerous in high water; all supplies and pack-train equipment had to be taken across in canoes.

The trail leaves the Stikine valley a short distance below Telegraph Creek, mounting rapidly to an elevation of about 2,750 feet, and soon descending into the valley of the Mestua (or 1st South fork), which is here a deep canyon.

Camp was made at the first available feed for horses, about seven miles from the Stikine. The hills and benches passed over from the Stikine valley are composed of volcanic ash-beds and basalts, the valleys being covered with their residual matter, chiefly sand, not suited to agriculture. The hills are sparsely covered with grass, which affords summer feed for horses.

August 7th. The pack-train was in motion from 7.30 until 2 p.m., during which time some fifteen miles were travelled in an easterly direction, and camp finally made at the upper end of Bulkley lake, or Destline lake, which empties into the 2nd South fork (or Klastline river) of the Stikine river. Bulkley lake is about three and one-half miles long by about a mile wide, unimportant in itself, but, at both ends, particularly at the easterly end or outlet, there are great areas of fine wild hay meadows; to this point the Telegraph Creek pack-trains are annually driven after the packing season, to be turned out to feed until about January 1st, after which they are taken to the home ranch to be fed on cut hay for the remainder of the winter. The plateau in which the lake is situated is at an elevation of about 2,900 feet, and contains quite a number of square miles suitable for raising hay and possibly oats. The soil is a very fair sandy loam, but the elevation is against its settlement for general farming. To the south-east of the line of travel this day there lies a range of hills of volcanic origin, several showing distinctly that they are composed of successive volcanic flows. These hills are locally called the "Craters," and they are credited with being the point of origin of the basalt and lava flows which have filled up the valleys of the Stikine and its tributaries near that point, a supposition which certainly seems quite probable.

August 8th. The trail followed was along the northern side of Bulkley lake (or Destline lake, as it is called by the Indians) to its outlet. From this point the Government trail follows down the left bank of Destline creek to the 2nd South fork, or Klastline river (where the Government has built a bridge), then up the right bank of the latter.

This Government trail from the lake is little used either by the Indians or whites, except when the river is in such high water as to render it unfordable some miles higher up at the ford.

The writer's party crossed Destline creek a mile or so below the lake, circling the meadows at the outlet, and bearing off to the south-east to strike the Klastline some ten or twelve miles above the bridge. This trail leads along a number of swamps and meadows until, as it nears the river, it rises on to the "Lava Beds," a bare plateau some miles wide covered with sheets and blocks of lava and devoid of vegetation except for a few small trees growing in the cracks of the lava.

After crossing the "Lava Beds" the trail plunges quickly down into the valley of the Klastline at an elevation of 2,300 feet, following it up for a distance of two miles to the ford, a crossing in use since early days.

Here a canoe is kept for the convenience of travellers in more than ordinarily high water; the canoe belongs to an old Indian woman in Tahltan, and it is customary with all travellers who use it to pay to the Indian Agent at Telegraph Creek, for her, a certain sum of money, from \$1 to \$5, for the use of the canoe, and it is creditable to the men travelling in the country to say that this payment is seldom evaded, and to the Indians that they keep the canoe in repair, a form of practical charity that might, with profit, be emulated by more civilized districts.

A sign on a blazed tree at this camp, marked "R.N.W.M.P.," stated that the "distance from Edmonton 1,350 miles" by the route taken by the Mounted Police.

August 9th. It had rained incessantly all night and continued so hard in the morning that camp would not ordinarily have been moved, but the river began to rise rapidly, and it was seen that if the river was to be forded it would have to be crossed at once, so the horses were rounded up and a start made at 1 p.m. and the crossing safely made.

A prospector named Watson, travelling in the same direction, packing his supplies on two dogs, was picked up here and helped across the river.

The north side of the river was followed up for some nine miles, when camp was made in a "brulé" that afforded some slight feed for the horses. After fording the river the Government trail was again picked up and followed. It was very bad, badly located and badly made, indicating little effort or time to make even a passable pretense at trail-building. In extenuation, however, it must be said that the length of trails expected to be looked after by the trail-gang is absurdly great for the force employed, and so remote from headquarters that the time is taken up in simply clearing out trails, without any attempt at improvement.

August 10th was spent in camp. It rained without ceasing all day, so hard that a sheet had to be rigged over the cooking-fire to prevent its being quenched.

August 11th. The rain of the day before continued, but, as feed for the horses had to be had, camp was broken in the rain at noon and a march of nine miles made up to the source of the Klastline and to the divide, at an elevation of 2,900 feet, between the waters of this stream and a fork of the Iskut which heads here.

The Klastline heads in a couple of small lakes in a deep canyon, the sides of which are of basalt, as is the whole country in this vicinity.

Around the headwaters of the Iskut there is considerable land suitable for summer grazing, but at an elevation of 2,900 feet.

Camp was made on the rocky edge of a beaver meadow, the first possible food obtainable for the horses.

August 12th. An early start was frustrated by "lost horses" and the pack-train was only in motion by 9.30. The trail led over a plateau at an elevation of about 2,900 feet, grass-covered for the most part, bordered by small timber and composed of gravel-wash, formed in rounded billocks, and pot-holes, indicating glacial action and quite obscuring any rock in place.

About noon descent was made to a fork of the Iskut river flowing easterly, which was followed down to its junction with another fork flowing westerly; this latter fork was followed up to its source on a large plateau, or watershed, between this fork and the Klappan river. This plateau is known locally as the "Klappan summit" of the trail, and is a favourite rendezvous for big-game hunters and for the Indians in the hunting season. It is at an elevation of about 4,000 feet, above which the mountains rise for about from 1,000 to 2,000 feet higher. Level table-lands on the summits extend for some miles to the north, but drop off to the south more quickly to a couple of large lakes on the headwaters of the Iskut river.

August 13th. Camp was not moved this day, as feed for the horses was very good, and they needed it. It was also desirable to allow the Klappan river, which had to be crossed on next day's march, to subside after the heavy rains.

August 14th. After travelling for a couple of miles across this flat summit-land at an elevation of 4,000 feet, the trail was followed down a gravel-covered side-hill to the Klappan river at an elevation of 2,700 feet, arriving there at noon after travelling about nine miles.

The river was found to be high and swift, so the horses had to be swum across first, and the party and equipment taken across in a small canoe which is kept there for ferrying purposes. The crossing of the river occupied over two hours, after which camp was made on the right bank of the river at the ford.

August 15th. On the right bank of the Klappan river a part of the old Ashcroft trail was found. This old trail was used in the old days of the Cassiar excitement to bring cattle to Dease lake. The stakes and cutting of an old survey-line were also found; this was a survey from Dease lake to Hazelton made by John S. O'Dwyer in 1899 for the Department of Railways and Canals of the Dominion Government.

It was noted that the wash in the creeks flowing from the north contained a good deal of slate-rock, indicating that a formation of sedimentary rocks, probably the Cretaceous coal-bearing formation, existed at no very great distance to the north, although the formation in the vicinity of the trail was of volcanic origin.

After travelling for 12 miles, camp was made a few miles below the mouth of the Little Klappan, an easterly fork of the main Klappan, which heads with the Spatsizi and Skeena rivers; whereas the southerly fork, or main Klappan, heads with a fork of the Nass river.

The valley of the main Klappan, travelled through, is about a mile wide, and contains a considerable area of land suited to agriculture, while the side-hills are covered with spruce and hemlock of fair size,

August 16th. The trail followed the main Klappan up to the mouth of the Little Klappan, where it branched off to the left, with rather an obscure turnout, and followed up the latter fork through a valley almost half a mile wide with some good bottom land, but with mountains rising steeply on either side; the source of the Klappan is about thirty-five miles from this fork.

After seven hours' travelling, in which only fourteen miles were covered, camp was made at the forks of the Little Klappan some eight miles up from the main stream, on the site of O'Dwyer's old camp No. 21.

August 17th. The old trail from this point follows up the right bank of the Little Klappan, crossing the stream somewhere below, but the Indians guiding the party, for some reason, considered it best to follow up the branch to its source on a summit at an elevation of 4,900 feet, after which a very rapid descent had to be made to the Little Klappan, striking it again about fifteen miles above the forks where it had been left. A reason given for this change of route was better feed for the horses, but it is suspected that the presence of innumerable ground-hogs (hoary marmots), to which as food the Indians are very partial and of which they killed a number on the summit referred to, had something to do with the choice of route.

The distance from the forks of the river to the summit at the source of the fork (Tsertia creek) was about fourteen miles and occupied seven and a half hours over a very indistinct trail, climbing to a height entirely unnecessary. To any one following this route the trail up the Little Klappan is recommended as better.

Camp was made on this summit, from which the snow had but lately melted, and, consequently, where it was difficult to find a dry place to set up the tents and have firewood within reach.

The formation of the mountains here consisted of shales, conglomerates, and sandstone very much broken and disturbed with numerous igneous intrusions, and of an average elevation of 7,000 feet, the whole indicating that the coal formation had been entered this day, but that it was in too broken a state to here give hope for workable coal. No coal could be seen in the wash of any of the creeks.

August 18th. A couple of hours' journey brought the party from the summit by a very steep trail down to the valley of the Little Klappan, fifteen miles above where it had been left the previous morning, and at an elevation of 3,900 feet.

This valley was followed up some eleven miles, when camp was made on a knoll (elevation 4,350 feet), where the river takes a sharp turn to the south, about sixteen miles having been travelled since morning.

This camping-ground is a famous rendezvous for the Indians hunting in the district, and is known as the "Indian Graveyard," from the fact that a number of Indians have been buried there; the Indians keep a lot of whipsawed lumber here to make coffins in case of emergency. The fugitive Indian Gun-a-noot uses this as a headquarters, and buried one of the women of his family here last season.

As soon as this part of the valley of the Little Klappan was entered it was noted to be in the coal formation, an exposure of over 2,000 feet thickness of shale, etc., being seen. The valley appears to be a denuded antilinal, from which the measures dip east and west with seemingly much regularity.

Coal was observed on Eaglenest creek some distance up, and float found in the creek, but no exposure of a seam could be found in the creek complete enough to permit of any measurements.

The samples of coal taken from here must be regarded more as specimens, since it cannot be stated what thickness or character of seam they are from. The following (A) is an analysis of the coal—a piece selected by the writer—not a general sample; while B (Mallock's Sample No. 9) is on a "picked sample" from the same locality:—

Sample.	Moisture.	Vol. Comb. M.	Fixed Carbon.	Ash.	Total.
A.	5.00	9.00	79.40	6.60	100.00
B.	4.14	8.43	80.27	7.16	100.00

In the vicinity of the Graveyard a number of coal-stakings were observed which bore on the posts the name of R. K. Lindsay, of Vancouver. It has since been learned that his Lot No. 20 covers the ground the Indian graves are on, and that he has staked here about 100 square miles of land, which, it has been reported, has since been turned over to Alvo von Alvensleben and associates.

As will be seen from the itinerary given, this part of the field is within ten easy drives of a pack-train from Telegraph Creek, from which point it seems probable that supplies will in the future be drawn.

At the "Indian Graveyard" the Little Klappan river, which below this point had flowed in a general north-west direction, takes an abrupt bend and flows in a north-east course between high hills, but the valley of the lower part of the river continues in a south-east direction, opening into a great, nearly flat, swampy plateau, several miles wide, flanked with gradually rising hills, which extends through to the Spatsizi river, and in which Trail creek, a tributary of the last-mentioned river, takes its rise, a couple of miles to the eastward of the Graveyard. This wide, low summit is at an elevation of about 4,200 feet above sea-level and forms a natural pass over on to the watershed of the Spatsizi river, which in turn heads in a similar flat summit meadow with the Khuakaz, or West fork of the Skeena, upon which most of the first of the coal claims were staked, thus forming a continuous and easy route for subsequent railway connection between the separate portions of the field.

The country all about here is distinctly in the coal-bearing formation; the portion lying under the plateau mentioned, at the head of Trail creek, and both to the north and south seems less disturbed and broken than do many other parts, giving hope that the coal-measures here may be found in more workable condition.

From the nature of the formation, however, it was not to be expected that coal-outcrops would be easily found, and prospecting here will have to be done by sinking or boring.

On the hill lying to the south-east of the Little Klappan, above the Graveyard and to the south-west of the plateau, or valley of Trail creek, the stakes of a group of claims, staked by Messrs. Pike, Bond, Beauclerk, and Simpson, were found.

There here appears to have been a fault, down-throwing to the west, in which is exposed a section of the measures at an elevation of 5,000 feet.

The strata, as exposed, show a heavy bed of sandstone underlain by a bed of conglomerate from 2 to 4 feet thick, again underlain by a bed of 25 feet of clay-shale showing fossil leaves; below this is a bed of shale carrying coal, samples of which gave analyses similar to those just quoted.

The disintegration of the measures here prevented the size or nature of the seam from being seen, as no work had been done on it, so that it can only be reported that coal of fair quality exists here. The measures have a strike of north-east and south-west, with a dip of about 15 degrees to the south-east.

As far as could be observed without an actual survey, the same ground appears to be covered by the stakings of both Messrs. Pike and Lindsay. Other stakes in the same vicinity bear the names of G. R. Hughes and G. R. Griffiths.

August 20th. Leaving the Graveyard at 8.20 a.m., a very indistinct trail was followed eastward along the marshy plateau—which was crossed with some difficulty—to the hill lying to the south-east, when Trail creek was followed up to its source on this hill. Towards its top, at an elevation of 5,400 feet, the hill is bare and seemed to be composed of shales and sandstones lying at low angles. The wash and debris showed numerous fragments of coal, but at no place could any coal-exposures be seen, nor could any workings be found.

The summit of this hill is a great elevated plateau, at about 5,000 feet elevation, extending for some miles to the south; the measures here showing little disturbance, although farther south the strata seemed to be broken by numerous faults, the peaks presenting sharp escarpments.

This undisturbed ground appeared to extend towards the west, nearly as far as the Little Klappan, beyond which the formation is broken and irregular.

To the eastward it extends well towards the Spatsizi River valley, which valley seems to have followed a line of fracture along the crest of an anticlinal fold in the measures.

Crossing this elevated plateau for four or five miles, the trail leads down Tenas, or Hankin, creek to the Spatsizi river. The river at this part was at an altitude of 4,100 feet and flowing northerly in a valley three-quarters of a mile wide.

The hills to the north-west appeared to be less broken than those to the south-east, although deeply cut by transverse valleys. On both sides of the valley the measures seemed to dip away from it, at angles of about 50 degrees, the strike of the measures being approximately parallel with the valley.

The hills to the north-west rise to a height of about 2,500 feet above the valley, the highest measures visible being two or three heavy beds of conglomerate with beds of reddish shale, the lower portion of the hills being masked by slide-matter.

After travelling fifteen miles from the Graveyard, camp was made on the wide, flat divide forming the watershed between the Spatsizi, flowing northerly, and at Kluakaz, flowing south-easterly.

August 21st. The valley of the Kluakaz was followed down this day for about thirteen miles farther, and it presented a very similar appearance to the portion passed through the previous day. The strata, as exhibited in the hills to the west, continued to be regular, perhaps even flatter than seen the day before; the hills to the eastward had become less steep, so much so that the lay of the strata was not visible from the valley.

August 22nd. After following the same valley down some eight miles farther, the first evidence of prospecting-work was encountered; this proved to be the workings of the B.C. Anthracite Coal Syndicate, known as the Campbell-Johnston camp, at Biernes creek. The camp had not been occupied during the season of 1912, and there was no one who could point out all the openings made, so it is quite possible some may have been overlooked.

Biernes creek is a large stream flowing from the west in a narrow valley ; the washing of the stream had exposed in its banks two or three coal-seams, all dipping at moderate angles to the east or under the valley of the Kluakaz.

On the left bank of the creek three tunnels were found which had been driven in on as many seams of coal, and, apparently, from one of these, an incline had been sunk for some distance on the seam. Unfortunately, the timbering of these openings had been insufficient, so that all had, more or less, caved in, preventing a full view of any of the seams, which were, however, estimated to be about 6 feet thick.

Where the coal could be seen in place in the seam, it was found to be in thin layers, with partings of shale or dirt, the seam as a whole being too "dirty" to be worked commercially.

As the tunnels had been driven in on the coal-seams, the dumps may be assumed to represent a fair sample of the seam as it would have to be mined. The dumps, it is true, had lain exposed to the weather, for at least a year, partly accounting for the condition of their contents, which had gone to powder, the coal being in grains and the shale partings into clay. No lumps of coal could be found in the dumps, except such as contained an undue proportion of iron-sulphide, and were therefore valueless.

On the right-hand side of the creek, a little farther up, another tunnel was found, the approach to which consisted of an open-cut made in the surface clay, and, as the sides of this had been unsupported by timber, they had slid in to such an extent as to form a dam which backed the water up into the tunnel to a depth of over 3 feet, thus rendering access to the interior of the tunnel impracticable. The coal from this seam had evidently been kept on a separate dump and was found to have disintegrated, as did that on the dumps on the opposite side of the creek.

Another tunnel had been driven in on a seam outcropping on the bank of the river at the camp, apparently an overlying seam ; the timbering of this also had given way and it was inaccessible. There was a pile of coal on this dump which had likewise disintegrated, with the exception of a few lumps, and these were full of quartz stringers. No satisfactory samples could be obtained of the coal in place, and no general samples of the dump were taken, as an assay was not required to show it was too dirty for commercial use, even had its physical conditions permitted.

The trip from Biernes creek to McEvoy flats, a distance of about twelve miles, was made during the afternoon ; the trail was found to be almost impassable, but fortunately it has since received attention from the Government road-gang.

Camp was made on the north edge of the McEvoy flats—a large flat, usually affording very good horse-feed for even a large pack-train ; at this season it was about eaten off by the numerous pack-trains from Hazelton, which usually rested here a few days before starting on their return trip.

August 23rd. The pack-train which had brought the party from Telegraph Creek was here turned back, and, it was subsequently learned, made its way back to Telegraph Creek in nine days.

It was found that the B.C. Anthracite Coal Company had established a camp on the south side of the flats, below Courier creek, as headquarters for the exploration parties in the field. This camp was in charge of H. F. Glassey, who kindly volunteered his services to guide the writer to the various prospecting workings in the vicinity, which offer was gladly accepted and proved of great assistance.

McEvoy flats, at the mouth of Courier creek, was the headquarters of the Western Development Company in the field, from which point all the prospecting of the various properties was done. This company has acquired sixteen claims of one mile square each, and all of these have been duly surveyed. These claims were the first staked in the field—in 1903 and 1904—and have naturally been better explored than some of the more recent stakings; the company, however, was quite unrepresented in the field during the season of 1912. The geology of this part of the field has been described in the printed reports of G. S. Mallock, of the Geological Survey; of Jas. McEvoy, etc., and need not be entered into here, attention being confined to the results of the development-work done.

A great deal of the prospecting development-work done by the company consisted of open-strippings and trenches to expose the coal-seams, and, as these had been standing for two years at least, they were all found to have now so caved in as to give no indication of what had been found; consequently, the effective development was confined to the tunnels, which, fortunately, had been sufficiently timbered and were found to be standing.

Trail Creek Tunnel.—The first workings found were on Trail creek, a quarter of a mile up from its junction with Courier creek. About 30 feet above the level of the creek a tunnel has been driven in on a coal-seam for a distance of about 50 feet in a general N. 60° E. direction. The strike of the seam was about south-east and north-west, with a very moderate dip to the measures—about 15 degrees. The tunnel was 7 x 7 feet, run in entirely on the seam. Coal still showed in the roof, so the full thickness of the top coal was not easily measured, but it is about 24 inches.

The following is a section of the seam as exposed in the tunnel:—		Ft.	In.
Top coal about.....		2	0
Dirt-parting		0	3
Dirty coal.....		0	10
Dirt-parting		0	3
Coal.....		0	4
Dirt-parting		0	2
Coal, hard.....		1	0
" soft		0	8
Dirt-parting		0	3
Coal.....		2	0
		7	9

A general sample of the seam was taken down the face exposed at the inner end of the tunnel; from this sample was excluded, as far as possible, all partings of over 1 inch; all the smaller partings were included. This sample gave upon analysis the following:—

Moisture.....	2.5	per cent.
Vol. matter	6.1	"
Fixed carbon.....	42.6	"
Ash.....	48.8	"
	100.00	"

The coal was much shattered, with a large number of small seamlets of quartz showing in the fracture planes; the seam also contained some sulphur-balls.

The coal-dump made from this tunnel had been exposed to the weather for probably two years, and was found to have crumbled to sand; the few solid lumps still remaining contained a visible amount of iron-sulphides.



Coal formation showing in Mountains on Upper Skeena.



Spatsizi River—near Trail Creek—looking North.

Another tunnel was found on Abraham creek, in a draw about three-quarters of a mile to the north-west of Courrier creek; this tunnel had been driven in for about 20 feet on a coal-seam 6 feet thick, having a strike of about east and west, dipping to north at an angle of 8 degrees, and with a fairly good roof of sandy shale or sandstone.

The following is a section of the seam in the tunnel:—

	Ft.	In.
Roof—sandstone.		
Dirty coal.....	0	6
Shattered coal.....	2	0
Dirt-parting.....	0	3
Hard coal.....	1	6
Shattered coal.....	1	9
	6	0

Two general samples of the coal-face of this seam were obtained—the first (A) sampled by the writer, leaving out all partings over 1 inch; the other (B) taken some days later by a visiting engineer, in the presence of the writer, and in which all partings over $\frac{5}{8}$ inch were excluded.

ANALYSES.

Sample.	Moisture.	Vol. Matter.	Fixed Carbon.	Ash.	Total.
A.....	2.5	8.1	62.3	27.1	100.0
B.....	3.0	6.6	66.0	24.4	100.0

The dirt-partings in these seams were not, as then exposed, a hard shale, but soft clay and sand; whether they were hard when first exposed to the air could not be learned.

The appearance of the coal in this tunnel was the best seen in the camp by the writer, but, nevertheless, the coal on the dump had disintegrated, under the influence of the weather, to a sand, not even a lump of clean hard coal being obtainable as a specimen.

It had been reported that there were a couple of tunnels on Discovery creek, but none of the men in the camp had ever seen these, and the writer could not find them; as no employee of the company was in the field, the search had to be abandoned.

These tunnels were afterwards found by G. W. Evans, an engineer employed by another company, who said he found them some miles up the creek while examining the field at a later date, and that the coal in these was cleaner and firmer than in the other tunnels and did not disintegrate as badly, much of it being still in good condition.

The following analysis is given by G. S. Mallock, of the Geological Survey:—

Sample.	Moisture.	Vol. Comb. M.	Fixed Carbon.	Ash.	Total.
No. 1 Lower tunnel Discovery creek.....	2.88	7.64	78.84	10.64	100.00

This company owns a large number of coal-areas in the field, and has **B. C. Anthracite Coal Company.** this past summer been earnestly and legitimately engaged, at a very heavy expense, in determining by substantial development-work and expert examination just what value the various properties have.

The heaviest development-work has been carried on at what is known as "Jackson's camp," situated on the northern flank of Groundhog mountain, on Trail creek, a small stream flowing into Courrier creek.

At this point the company had erected two substantial log buildings—a cook-house and bunk-house—and has established a force of four coal-miners, as well as some outside men, under the charge of Arthur Challoner, a certificated mine foreman.

This force was expected to be kept at work developing at a depth the coal-seams described later, and the results of this deeper development will be looked for with much interest.

No. 1 or Godfrey Tunnel.—This tunnel is located on Trail creek, about three-quarters of a mile from its mouth and at an elevation of 3,250 feet. The tunnel had been driven in for 42 feet from the portal, but at this distance was just getting out of the wash and into the solid coal-seam, so that the coal-face could not be expected thus to be as good as it would probably prove farther in.

As it was seen, the coal in the face consisted of layers of coal with dirt-partings, the latter so frequent that the seam at this point was scarcely up to an economic fuel.

Two samples were taken of the coal-seam as exposed in this tunnel, viz. : A, a general sample of the face of the tunnel, and B, a sample of the lump coal free from all partings. The following are the analyses :—

Sample.	Moisture.	Vol. Comb. M.	Fixed Carbon.	Ash.	Total.
A.	2.7	5.6	53.4	38.3	100.0
B.	2.3	5.1	71.1	21.5	100.0

The coal from these tunnels had but recently been mined, and showed a fair percentage of lumps on the dump ; as it had not been exposed to the winter's action, it cannot be stated whether it would withstand the action of weather any better than that on the dumps of the other properties.

These coal-seams all show extreme pressure and the coal is much shattered, containing numerous small veinlets of quartz, which doubtless account partly for the high ash-content of the samples.

No. 2 Tunnel is near the bunk-house, and had been driven in for 120 feet on the strike of a coal-seam dipping at about 20 degrees ; the level course of the tunnel had brought it very near the surface of the ground in a small draw, so the work had been stopped.

The seam exposed is about 7 feet thick, with some very fair-looking firm coal, but contains a number of dirt-partings throughout the seam, which would render the coal as mined very dirty.

No general sample of the coal-face was taken, but one obtained of the lump coal from the tunnel assayed as follows :—

Moisture.	Vol. Comb. Matter.	Fixed Carbon.	Ash.	Total.
3.4	5.4	70.8	20.4	100.0

No. 3 Tunnel has been driven in for about 160 feet and appears to be on a seam which overlies No. 2 seam, and which also dips on an angle of about 20 degrees, with shale roof. The coal-seam is from 6 to 7 feet thick, but towards the inner end of the tunnel it pinches to about 2 feet thick, although at the face the roof was rising, so that probably the normal thickness would soon return.

No sample was taken of this seam, which appeared very similar to the two others sampled.

Besides these tunnels sampled and described at Jackson camp, the company had done other work partly as follows :—

Head of Jackson creek, at the timber-line, there had been two tunnels driven in, each for about 20 feet—the first on an 8½-foot seam dipping at an angle of 85 degrees, and the second on a 5-foot seam dipping at 20 degrees.

The coal is reported as of the same character as that in Jackson camp, and carried the usual sulphur-balls and dirt-partings.

On Brewer creek, the first left-hand branch of Courier creek, about two and a half miles up from McEvoy flats, two tunnels had been driven in a short distance on two seams, about 4½ feet thick, and dipping respectively at 20 and 75 degrees. The coal here was of about the same character as in the other workings.

The company had also developed a couple of coal-seams on the 2nd fork of Courier creek, each about 4½ feet thick, dipping respectively at 20 degrees and nearly flat.

TELFER CREEK.

On Telfer creek the B.C. Anthracite Coal Company was found to have done an amount of preliminary development with a force of men under Seth Godfrey.

This work consisted in opening up the outcrops of the various seams, and the running of short tunnels on them ; this work was done primarily to render the seams visible for the inspection of G. W. Evans, a coal-mining geologist who was engaged in making a report on the properties of the company.

Here within the distance of 400 yards, and a vertical height of 200 feet, some six coal-seams have been exposed in the left side of the creek.

No. 1 Tunnel.—The lowest or No. 1 tunnel is at an altitude of about 3,825 feet, and has been run in for three sets of timbers on a coal-seam, but had not been driven far enough to strike solid coal ; that showing was very much crushed and shattered and, as exposed, very dirty. The thickness of this seam was not demonstrated exactly, but it was of a workable thickness. The dip of all these seams is into the hill in a N. 65° E. direction, at angles approximating 25 degrees.

No. 2 Tunnel is some 200 yards farther up the hill, and has to be driven in for about 20 feet, disclosing a 5-foot coal-seam, which was very much shattered and quite “dirty.”

No. 3 Tunnel, still higher up, has touched a coal-seam, but has to be driven farther to show what the seam amounted to.

No. 4 Tunnel had been driven in for 15 feet, and had disclosed a coal-seam 6 feet thick, in which the coal appeared more hard and compact than in the other seams, but in which the small dirt-partings were so prevalent as to make the seam dirty. The coal already on the dump showed the same tendency to disintegrate as in the camp generally.

No. 5 Tunnel has only been driven in for 10 feet, and shows a 5-foot coal seam, of which about 18 inches was fairly clean, but the remainder was quite dirty.

No. 6 Tunnel was not through the slide-matter, but the indications were that it would disclose a coal-seam.

LANGLOIS CREEK.

The B.C. Anthracite Coal Company had also a party of men working at the head of Langlois creek, on the flank of Table mountain, at an altitude of 5,300 feet—far above timber-line. This work was more of an exploratory nature than to develop any known seam.

The formation on the surface on the top of the mountain was locally so broken as to give little idea of where the coal seams, here exposed, might be found at a level where it was possible to work.

A tunnel had been run for about 12 feet on a seam dipping to the south-east at about 30 degrees, which showed 20 inches of fairly hard coal; the remainder of the seam is very soft and dirty.

Another opening at the same elevation showed about 4 feet of fairly hard coal, about the same in character as the seams seen elsewhere.

Another seam—at an altitude of 5,200 feet—which is claimed to be a 17-foot seam, showed in present development about 3 feet of fairly hard coal; the work had not progressed far enough to show up the whole seam. This coal was fairly hard and solid, but very dirty.

SUMMARY.

The coal-bearing formation, as far as at present indicated by prospecting, covers an area extending about seventy-five miles in a north-west and south-east direction, with a width of about forty miles. This area includes the headwaters of branches of the Skeena, Stikine, and Nass rivers, which here head together at an altitude above sea-level of about 3,800 feet, above which the mountains, also composed of the coal-measures, rise from 1,000 to 3,000 feet higher.

The presence of coal-seams has been indicated by prospecting over a large proportion of this area, but only in the southern end of the field, where the earlier discoveries were made, had there been any serious attempt made to prove by development the nature and extent of the seams.

Speaking generally, the only important development-work done, as far as I was able to observe or learn, has been on the Skeena watershed in the vicinity of Biernes, Courier, and Trail creeks.

I would estimate the total area of the coal lands already as in the vicinity of 2,000 square miles, but I am not at present able to submit figures other than an estimate. Of this total area, I would further estimate that about 20 per cent. of it lies on the Nass watershed, about 40 per cent. on the Stikine, and 40 per cent. on the Skeena watershed.

The whole coalfield appears to have been subjected to a severe geological thrust, acting in a south-west and north-east direction, which crumpled and folded the coal-measures, thereby developing a series of roughly parallel mountain-ranges, with intervening valleys, running in a north-west and south-east direction.

Where this folding happened to break the strata most severely, the greatest amount of subsequent denudation and disintegration would naturally occur, and, since it is largely to this denudation that the exposures of the coal-seams are due, it is altogether probable that the exposures and developments so far made are in the zones of greatest disturbance, so that, consequently, it may reasonably be hoped that a more detailed study and examination of the field will result in the discovery of beds of coal which have not been subjected to such great strains, and where the coal will be found more compact than in the localities so far developed.

It was on the Skeena watershed that the earlier stakings were made, and here, as might be expected, has systematic prospecting first taken place. Here the numerous locations have been gradually segregated into large holdings, the owners of which appear to have adopted the wise plan of so far pooling their interests as to form a joint development syndicate—The B.C. Amalgamated Anthracite Coal Company—(on what financial basis I am not fully informed) for the purpose of having the whole area of their holdings jointly examined and reported upon by competent coal-mining engineers.

The syndicate operations in the field were under the management of Amos Godfrey, who, with a considerable force of men, with the necessary pack animals, was busily engaged all season in uncovering and bringing to view coal exposures and outcrops on the various properties, and preparing them for the inspection of two parties of coal experts respectively under the leadership of G. W. Evans, of Seattle, and G. Grossman, of Vancouver.

This expert examination and the preparing for it occupied the syndicate's attention all season, to the exclusion of any very extensive development operations, and upon the reports of these experts largely will depend the future activities in this part of the coalfield.

Outside the work just mentioned, the only other important development-work being done in the field this past season was at Jackson camp on Trail creek, on the northern slope of Groundhog mountain, where, under the charge of competent coal-mine officials, the owners have established a permanent camp, and have kept a force of from four to eight men employed all season driving in a series of adit tunnels on the coal-seams outcropping some 400 to 500 feet above the level of the Skeena valley at this point.

In September arrangements were completed and sufficient supplies in to keep a force of from six to eight men employed here all winter in doing more extended and deeper development-work under the charge of Arthur Challoner.

On the mountain to the east of the Skeena river, opposite the mouth of Courier creek, another winter camp was being constructed, where another party of about four men under the charge of Seth Godfrey will be similarly occupied all winter.

With the exception of a party from the Geological Survey of Canada under G. S. Mallock, and a Provincial Government survey party under J. H. Taylor, B.C.L.S., these were the only parties at work in the field this past season.

The property of the Western Development Company, known as the McEvoy locations, was not represented in the field this year by any one, and it was with great difficulty that their various development tunnels, made in previous years, were found. Some of these tunnels had caved in, while the various test-pits and trenchings were invariably found partly filled with earth, so that little could be learned from them.

The B.C. Anthracite Coal Syndicate properties near Biernes creek, forming what is locally known as "Johnston's camp," were also unrepresented this season.

A number of tunnels driven, in a previous year on coal-croppings, were examined, but in every instance it was found that, owing to insufficient timbering, these tunnels were so completely caved in as to render entrance into them impossible, so that the results obtained therein had to be gauged by the contents of the dump.

At the two properties last mentioned, the dumps have lain outside for one or two winters, and it was found that the coal and shale taken from the tunnels, and forming the dumps, had to such an extent disintegrated as to render the coal unmarketable.

The seams vary in thickness from 3 to 8 feet, with some possibly thicker, and are composed of alternating layers of coal with bands of what probably would be found, when under sufficient cover, to be shale, but which, as exposed to the atmosphere, have disintegrated into an earthy sandy clay. These layers of coal each have a thickness of from 6 to 18 inches, and possibly 24 inches, while the "shale" partings vary from $\frac{1}{4}$ to 3 or 4 inches in thickness.

The coal, so far developed, is found to be very much shattered, and the cleavage-planes are filled with foreign matter, such as quartz, calcite, etc., brought in in solution.

A number of the seams exhibit the presence of a large amount of iron, occurring as sulphides, probably arsenical, judging from the white efflorescence left on the faces of the coal.

The seams as exposed, speaking generally, are decidedly "dirty" and will run high in ash; how far this can be corrected by washing can only be determined by experiment. This washing process has frequently to be resorted to with anthracite coals.

Perhaps, for the reasons already stated, that the developments so far have been in the zones of greatest movement, the coal as exposed was found to be too friable and subject to disintegration to have a high commercial value.

That these conditions may change when greater depth is obtained and in more favourable localities is the present hope, which the work in hand for this coming winter will go a long way towards settling, and without which it is not advisable to pass any final judgment on the character of the coal, for the outcrop of even the best-proved seam is never very attractive.

The value of the field from a commercial view-point will not be determined until the result of this winter's work is known, and possibly it may be necessary to do some extensive boring in the flatter-lying and more undisturbed localities before final results are obtained.

Up to the present time all access to the field has been from Hazelton, following the "Telegraph Trail" to between the 5th and 6th Cabins; thence following the old Ashcroft trail, used in the '70's, up Slowmald creek to its source and over Groundhog mountain, at an altitude of 5,700 feet, dropping again to the valley of the Skeena at an altitude of 3,000 feet.

The contract rate for packing over this trail this past season was 20 cents a pound, but owing to the character and condition of the trail the packers did not make wages, even at this rate. A new trail, along a better route, which might be gradually converted into a wagon-road, is urgently needed.

OTHER REPORTS ON THE FIELD IN 1912.

The Report for 1912 of G. S. Mallock, of the Canadian Geological Survey, who has spent the past two seasons in the Groundhog coalfield, has not yet been issued, but the following is from the "Press Bulletin" issued by the Geological Survey in February, 1913, a summary of the work done during the season of 1912:—

"G. S. Mallock continued his examination of the Groundhog mountain coalfield and determined the southern, eastern, and northern boundaries of the area in which coal-bearing strata occur. The southern boundary is situated near latitude $56^{\circ} 50'$, the eastern follows the Duti fork of the Skeena to Shawni lake, thence to the valley of the Kluatantan, from which it passes over a flat divide to the Khuyetz fork of the Stikine, and thence over another divide to the Little Klappan river. The northern boundary is approximately latitude $57^{\circ} 30'$. Information given by prospectors leads one to believe that the western boundary runs up the East fork of the Nass river and over a divide to the main fork of the Klappan. The dimensions

of the field are thereby roughly forty-five miles by thirty, but in parts of this area the coal-bearing rocks have been removed by erosion. While many new outcrops of coal were discovered this year, no marked improvement in quality was noted, quartz or calcite veinlets being present in nearly all the seams, and nigger-heads and numerous thin bands of bone occurring in many of them. A closer examination of the structure proved the existence of many more faults than were recognized last year.

“Following is a report of the proximate analyses made in the laboratory of the Mines Branch, by fast coking, of nine samples of fuel from the undermentioned localities in the Groundhog mountain coal-field, and one (No. 10) from the Sustut basin, B.C. Collected by G. S. Mallock, Geological Survey:—

“No. 1—Lower tunnel, Discovery creek.

“No. 2—Top showing on Anthracite creek.

“No. 3—Two miles north-east of Groundhog summit; seam 6 feet.

“No. 4—Summit of Jackson mountain; seam 3 feet.

“No. 5—Little Klappan river; seam 9½ feet.

“No. 6—McDonald creek; seam 6 feet.

“No. 7—Creek north of McDonald creek (Blume creek); seam 9 feet.

“No. 8—Picked sample from seam on the Khakaz branch of the Skeena river, above Langlois creek.

“No. 9—Picked sample from a 3-foot seam on mountain north of Indian Graveyard camp, on Little Klappan river.

“No. 10—Mountain north of junction of Bear and Sustut rivers, Sustut basin. Latitude 56° 15', longitude 126° approx.

“PROXIMATE ANALYSES OF SAMPLES OF COAL FROM GROUNDHOG BASIN.

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
Moisture	2.88	6.09	10.52	10.16	4.48	5.02	6.85	3.24	4.14	5.40
Vol. combustible.....	7.64	13.70	22.15	23.73	9.98	6.38	13.76	7.67	8.43	23.32
Fixed carbon	78.84	65.52	40.81	45.79	63.48	66.95	58.08	68.92	80.27	57.48
Ash	10.64	14.69	26.52	20.32	22.06	21.65	21.31	20.17	7.16	13.80
	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

G. W. EVANS'S REPORT.

Geo. Watkins Evans, of Seattle, was one of the two coal-mining engineers engaged by the B.C. Anthracite Coal Mining Company to examine a portion of the coal-field, the southern portion being covered by his examination.

The reports made were, of course, private and the property of the employers, who have not seen fit to supply the Department with copies, so that the results of these examinations cannot be given.

Mr. Evans, however, read a paper before the Canadian Mining Institute at a meeting held in Nanaimo in March of this year, entitled “Some Notes on the Groundhog Coalfield,” from which the following extracts have been made:—

“TOPOGRAPHY.

“The elevations in the field range from about 3,000 to 7,200 feet above sea-level. To the east of the field proper is a range of rugged mountains made up of a series of thickly bedded conglomerates, and on the west another range of rugged peaks of sandstone and shales with some beds of conglomerates.

“In places the hills show the effects of glacial erosion and are considerably rounded, while in other places there are many sharp cliffs the scars of fault-planes.

“From a railroad point of view the topography is not severe, for railroads can be built to almost any point without any insurmountable difficulty. From a scenic point of view the district is beautiful.

“GEOLOGY.

“The geological age of this field is Lower Cretaceous, and is of the same age as the anthracite field of Alberta and the bituminous coalfield of eastern British Columbia at the Crowsnest pass. The Groundhog field is bounded on the east by the Palaeozoic metamorphics and on the west by the Post Cambrian intrusives.

“In my examination of the field I separated the geological column into four subdivisions and have called them the Conglomerate, Trail Creek, Telfer, and Table Mountain series. The Conglomerate being the lowermost and the Table Mountain series the uppermost.

“The subdivision is arbitrary so far as the Trail Creek and Telfer series are concerned, and I have endeavoured to separate the coal-bearing strata into the non-commercial and commercial classifications respectively. I must necessarily refrain from discussing the positions of these series, for it is of interest only to those for whom I examined the field.

“These data are confidential and for that reason I will omit details. All you care to know is something of the character of the coal and the probable extent of the known commercial area: you are not interested in knowing where it occurs.

“As stated above, I have separated the geological column into four parts, and these I describe briefly below.

“Beginning with the Lower or Conglomerate series, we find that this series is made up of many beds of conglomerate, some of the beds being from 150 to 200 feet thick, and the particles are the size of hen's eggs.

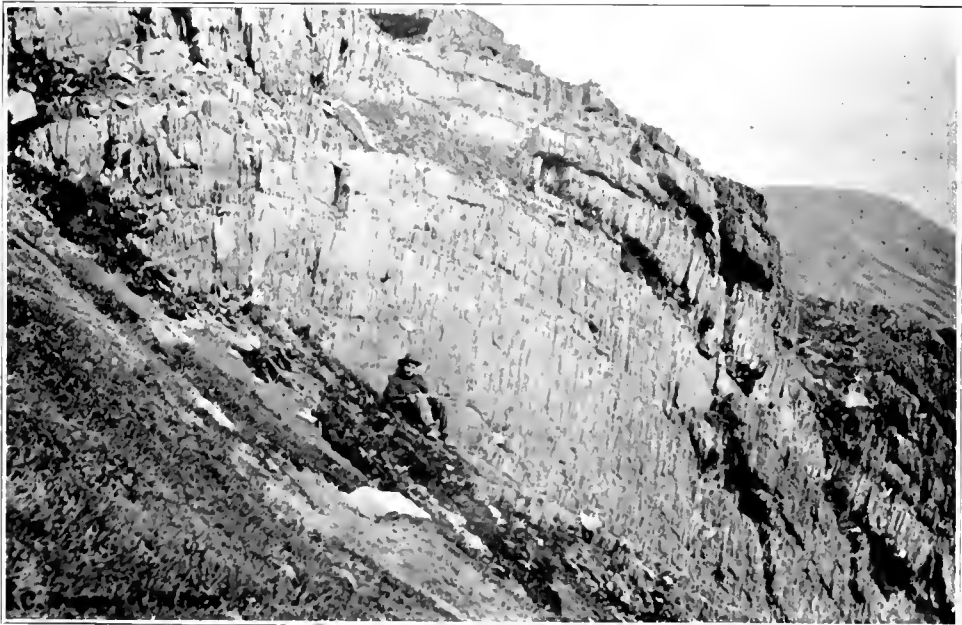
“The next series upward in the column is the Trail Creek series. I have selected the lower 2,800 feet of the coal-bearing strata as representing this series. It is made up of beds of sandstone, shale, and coal, and bony beds, with several beds of carbonaceous shale.

“There are many outcrops of coal in the area in which this series outcrops, but nearly all are too high in ash to be of much commercial value. Samples had previously been made of coal taken from some of these beds, but surely they did not represent the product as it would be in actual mining operations, but were, in all probability, picked samples.

“In the samples that I selected, I took what in my judgment would go into the mine-car in the event that any of these beds are mined. The sampling was fair and made in the most approved manner, but the resulting analyses showed that most of the beds were too high in ash to be considered commercially valuable, in view of other better beds known to exist in other parts of the field. Had some of the outcrops contained coal sufficiently clean, the crushed condition of the coal and the highly disturbed strata would be a severe handicap for the economic working of great portions of the area. The area has not been entirely prospected, and it is not impossible that later beds of economic value might be found.



Groundhog Coalfield—showing Contortions of Strata.



Groundhog Coalfield—showing bending of Measures.

"The Telfer series, which overlies the Trail Creek series and which represents the upper 1,150 feet of the coal-bearing strata, is made up of beds of sandstone, shale, coal, and bony beds.

"As stated above, this series represents what in my judgment should be regarded as the commercially valuable portion of the coal-bearing series. There are two or more beds in this series that are indeed very promising. The following analyses were made from a fair sample taken from one of these outcrops: Moisture, 2.62; volatile matter, 6.96; fixed carbon, 84.49; ash, 5.93; sulphur, 5.75; and 13,814 B.T.U.

"The coal in this bed at the outcrop is firm and bright and will produce a very large percentage of lump coal. The coal will stand handling, and taken as a whole the bed promises to be a most excellent one. The walls are firm and will make splendid bottom and roof for actual mining operations. The coal in the bed is 5 feet 4 inches thick, with but one parting.

"In the properties I examined, an area of probably twenty-five square miles is underlain with this series; and it is highly probable that the series extends to the northwestward out of the area I examined.

"The Table mountain series overlies the Telfer series, I believe unconformably. This series is over 1,500 feet thick. The only effect it will have on the underlying strata is where it becomes so thick that it will be too great an overburden for practical operations of some of the lower beds in the Telfer series.

"GEOLOGICAL STRUCTURE.

"The entire region is thrown into a series of folds, with their axes lying in a north-west, south-east direction. The courses of the streams are controlled more or less by the directions of the folds.

"The axes of the folds plunge to the north-west from a point near the mouth of the Klua-tan-tan (Moss) river, and it appears that they plunge to the south-east from a point north-west of the mouth of Bieme creek. In this event the Groundhog field occupies, as it were, a huge elongated basin, which is made up of a series of synclines and anticlines, with the former predominating and thus forming a synclinorium. The series is eroded in many places, leaving only the synclines, and the resulting field represents the remainder of a very much larger area of coal-bearing strata.

"The folding and faulting are much more severe in the Conglomerate series and become less severe as the top of the column is reached. In the lower beds there is evidence of severe compression, and in many instances slaty cleavage has developed.

"Even though coal-beds commercially clean be later found in the Trail Creek series, the severe compression, with its resulting folding and faulting, will be troublesome and expensive; in fact, too expensive to be able to compete with the less folded areas.

"Many of the folds I observed, and in fact nearly all of them, were overturned, with their axes dipping to the south-west.

"TONNAGE.

"I have seen from time to time tonnage estimates of this field. I have seen no explanation as to how these estimates have been arrived at, and so far have seen nothing better than a wild guess. Personally, I have calculated tonnage of portions of the field where I have been able to work out the geology with some degree of accuracy, but these are little better than good guesses; to my mind, to calculate a tonnage estimate for the entire field is a waste of time and misleading.

" METAMORPHISM TO ANTHRACITE.

"The coal-beds of this district are of the same age as the bituminous beds of the Crownsnest Pass field. The change from bituminous to anthracite has been caused by the extreme compression accompanied by highly heated waters. These were the agents that caused the change in this field. Evidence of the extreme pressure is to be found in the numerous and complex folds now to be seen, and the presence of heated water is to be had in the numerous stringers of quartz and calcite now seen in many of the coal-beds, and also in most of the joint planes of the rocks.

"Summarizing, we have about the following: There are some coal-beds in the Groundhog coal-field that contain excellent coal; in fact, so far as I have seen, the best domestic coal to be found on the Coast. Such a coal will find a market for a reasonable yearly tonnage. Mining conditions in portions of the field will be such that coal can be mined at a reasonable cost, while in other parts the cost will be prohibitive. Transportation to the tide-water can be provided along feasible routes, and transportation charges will probably be within reason, considering this grade of coal. It is reasonable to believe that within the Skeena, Klappan, and Nass watersheds there will be found a sufficient amount of high-grade coal which can be mined at a reasonable profit to warrant building a railroad into this part of the country.

"In conclusion, I might add that, in my judgment, this field will not compare with the Pennsylvania field, either in quantity of coal or in mining costs, and I take this opportunity to make this statement for the reason that my name was coupled with an article recently which made this statement. However, I do regard the field as a valuable asset to the Province of British Columbia, and one that should be exploited along sane lines, with prudence, and not by wild and extravagant statements which never do any good, but only pave the way for a great deal of harm. The thing to do is to get at the facts and stick to them.

" ANALYSES OF SOME OF THE GROUNDHOG COAL-BEDS.

Number.	Moisture.	Vol. C.M.	Fixed Carbon.	Ash.	Sulphur.	B.T.U.
1	4.42	6.58	58.96	30.04	1.61	9,930
2	4.01	13.08	57.71	25.20	2.42	9,600
3	2.71	6.09	67.42	23.78	3.05	12,650
4	2.97	5.59	65.60	25.84	1.90	11,520
5	2.45	3.86	63.96	29.73	1.93	10,280
6	3.55	4.02	70.68	21.75	0.99	11,980
7	3.75	5.74	65.13	34.36	1.57	9,600
8	4.50	6.25	47.73	41.52	0.99	7,800
9	3.77	4.27	57.75	34.21	0.69	9,580
10	5.95	13.32	46.67	34.06	0.44	9,360
11	3.20	7.02	49.43	40.35	0.99	7,860
12	1.17	6.05	76.20	16.58	0.72	12,215
13	1.04	9.39	67.89	22.68	.....	.....
14	1.17	6.54	83.37	8.92	0.74	13,238
15	2.39	7.90	78.54	10.18	0.99	.....
16	4.12	7.43	82.60	5.85	0.46	.....
17	5.95	8.00	82.00	4.05	0.49	.....
18	2.62	6.96	84.49	5.93	5.75	13,814
19	5.75	7.34	75.26	11.65	.....	.....
20	4.45	8.75	79.25	7.55	.....	.....
21	1.40	6.06	70.68	21.86	1.60	11,788

SKEENA DISTRICT.

SKEENA AND BELLA COOLA MINING DIVISIONS.

REPORT BY J. McMULLIN, GOLD COMMISSIONER.

I have the honour to submit herewith my annual report as Gold Commissioner for the Skeena and Bella Coola Mining Divisions for the year ending December 31st, 1912.

OBSERVATORY INLET.

At Granby bay the Granby Consolidated Mining and Smelting Company has under construction a large smelter, which will be well on the way towards completion by the end of 1913. The confidence of this company in the mineral resources of the surrounding country is shown by its extensive investments. This has acted as a stimulus to others interested in mining, with the result that the country at the head of Alice arm was prospected over, and has been most favourably reported upon. There are several groups of claims in this locality upon which from two to five years' assessment-work has been done, and the results have been eminently satisfactory. With better access to these properties, increased shipping facilities, and a smelter close at hand, it should be but a short time until they become shipping mines.

COAST.

Considerable prospecting has taken place during the past season on the coast and the islands adjacent thereto. Several deposits of iron have been located, and assessment-work has been done on a number of claims in the vicinity of Kumeoleon inlet. In the neighbourhood of Swanson bay, Kickane inlet, and Khutze inlet, more interest has been shown than in any previous season, some very fine samples of bornite having been taken out.

Messrs. Martin & Shannon, who have large holdings in this locality, have done extensive development-work, which has warranted them in Crown-granting over thirty of their claims.

During the past season, operations on Princess Royal island have resulted encouragingly, and it is the intention of the companies operating there to do more extensive work next season.

OFFICE STATISTICS—SKEENA AND BELLA COOLA MINING DIVISIONS.

Free miners' certificates	415
Mining claims recorded	303
Certificates of work	361
Bills of sale and agreements	98
Certificates of improvements	22

Revenue.

Free miners' certificates	\$2,348 25
Mining receipts	4,360 75
	\$6,709 00

SKEENA MINING DIVISION.

MINERAL CLAIMS ON PRINCESS ROYAL ISLAND, B.C.

REPORT BY H. CARMICHAEL, PROVINCIAL ASSAYER.

Princess Royal island lies on the coast of British Columbia, 180 miles north of Vancouver Island. The island is of considerable size, being sixty miles long by twenty miles wide. It is very mountainous, but is intersected by lakes and numerous channels which afford good waterways.

One of the fiords, called Surf inlet, runs twelve miles in from the Pacific ocean, forming a safe channel for sea-going vessels; at the head of the inlet Cougar lake empties with a fall of 30 feet into the sea.

Cougar lake is one of a chain of lakes which, with short portages, gives easy access to a large section of the island.

The mining claims visited were the *D.L.S.* group and the *Princess Royal* group. These claims are on either side of a small stream flowing out of Paradise lake, and are reached by a short portage from Surf inlet to Cougar lake, a row of two miles along the lake, then a portage of a mile from Cougar lake to Bear lake, then a row of three miles up Bear lake to Paradise creek.

The main tunnel of the *D.L.S.* group is situated on the north-west side of the creek about a mile and a quarter from Bear lake, and at an altitude of approximately 800 feet above the lake or 850 feet above the sea-level; there is a good trail from the lake to the mine.

The property is held by the Surf Inlet Gold Mines, Limited, 206, Bank of Ottawa Building, Vancouver, B.C.; A. B. Clabon, Secretary.

The company owns nine claims located on the strike of a quartz vein occurring in granite country-rock and running diagonally into a mountain-ridge.

Bluff Claim.—The principal work has been done on the *Bluff* claim. A small creek on the side-hill cuts through and exposes a quartz vein dipping south-west into the mountain at an angle of 32 degrees. The vein has been followed by a tunnel in a northerly direction for a distance of 500 feet.

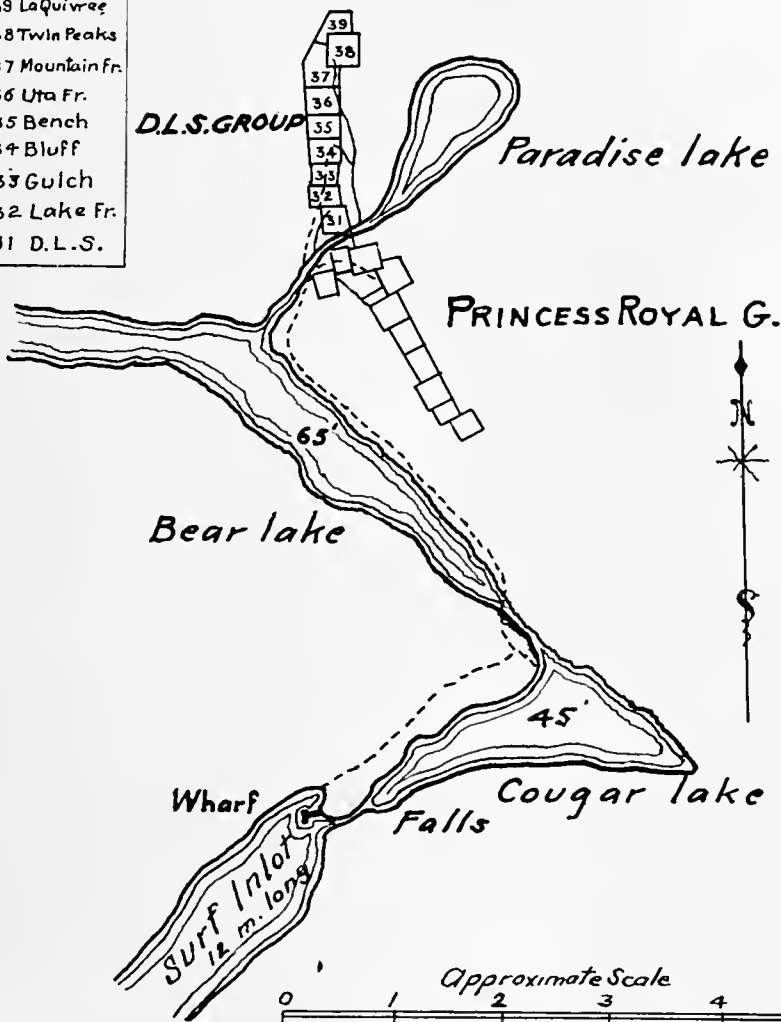
At 20 feet in, a short crosscut was run to the right, cutting through the foot-wall, which is well-defined with gangue-matter; the tunnel then swings slightly to the left, following the vein, but turning again to the right, so that the general direction is about N. 30° W. At 135 feet in, the tunnel cuts through a diabase-dyke 7 feet thick, which, however, does not displace the vein; 25 feet farther in a crosscut 12 feet long was run to the hanging-wall, and a winze 18 feet deep was sunk on the dip of the vein. Up to this point the vein-filling is quartz, with iron-pyrites scattered through it, and also a little arsenical pyrites.

For the next 50 feet, the tunnel is entirely in vein-matter, showing a fair amount of ore on both sides in a short crosscut of 5 feet run to the right to the foot-wall.

At 235 feet in, the vein pinches, but again swells out, and a good ore-shoot was struck at 300 feet. From this point a long crosscut is being run to the left at a deflection angle of 40 degrees to cut a vein lying to the west of the "main vein," and on which some work has been done. This crosscut had been run 243 feet, all in a granitoid rock, but at the face the ground was becoming brecciated and it seemed likely that the zone of disturbance, carrying the "west vein," was being entered.

*D.L.S. GROUP, PRINCESS ROYAL ISLAND
 OWNED BY SURF INLET GOLD MINES LTD
 Sketch Showing Relative
 Position of Claims and Salt Water.*

- | Claims |
|-----------------|
| 39 LaQuivree |
| 38 Twin Peaks |
| 37 Mountain Fr. |
| 36 Uta Fr. |
| 35 Bench |
| 34 Bluff |
| 33 Gulch |
| 32 Lake Fr. |
| 31 D.L.S. |



The main tunnel has been continued from where the crosscut branches off in the same north-westerly direction; for 50 feet it follows the foot-wall, where a fair grade of ore was taken out; at this point a short drift of 12 feet was made to the left and is all in a fair grade of ore. The hanging-wall is there followed for a further 50 feet, when a drift was run to the left for 20 feet; this drift to the face is all in ore. The tunnel keeps the same general direction for another 50 feet, but the ground is more broken and the foot-wall is not well defined, what appears to be a horse coming in. At the time the property was visited the face of the main tunnel was in 500 feet; at this point, while the ore was showing, it was more broken and the vein seemed to swing more to the right; later information would confirm this, as the tunnel has been driven farther to the right and is reported to be in solid ore.

From the face a short drift has been run to the left, but, except for a few stringers, was in country-rock.

A trail goes along the hillside to the north, rising above the tunnel; this leads to a gulch where a strong outcrop of a quartz vein is seen dipping into the hill and having the same general strike as the vein in the tunnel, so that there is every reason to suppose it is the same vein.

At 280 feet north of the tunnel-mouth and 171 feet above it, an inclined shaft had been sunk on the outcrop of vein, having a dip of 32 degrees to the north-west; the shaft was reported to be down 50 feet, with ore at the bottom, and an upraise run to the hanging-wall, which it cut through, giving the vein a width of 18 feet; but this could not be examined as there was several feet of water in it.

This vein is well defined and has the same dip and general character as seen in main vein in the tunnel. It is the intention of the management to run an upraise from the main tunnel to connect with this shaft.

What is known as the "west vein" outcrops in the creek 300 feet to the north-west of the portal of the main tunnel and 143 feet above it.

A drift from the gulch was run in on the vein for 30 feet, showing good ore, from which high values were obtained. As working was difficult from the adit on the gulch, a short drift was run through a shoulder of rock to the hillside, and this is the working entrance.

At 25 feet in from the gulch a drift was run to the left for 300 feet; this is for the most part in a quartz-breccia with good ore showing in the face. From the intersection of the right drift the tunnel has been driven in a northerly direction for 40 feet, mostly in country-rock with a little quartz. The tunnel then swings to the left, running nearly north-east for 30 feet; at 7 feet from the turn a stringer of iron-pyrites 10 to 18 inches wide was cut; this yielded fairly high assays in gold, otherwise the tunnel is in country-rock. At 30 feet from the turn to the left, the tunnel cut into a well-defined quartz vein dipping at 40 degrees to the north-west. A drift at right angles follows the foot-wall of the vein north-easterly for 30 feet, for which distance the vein is well defined and the face in ore, the samples taken giving good values. The mineralization consists of iron-pyrites, with a little arsenical pyrites, in quartz gangue. This is the vein that the long crosscut-tunnel from the main vein is expected to intersect.

Summary.—The property contains two or more well-defined quartz veins which have been proven by underground work for considerable distances. It is fairly easy of access, and the treatment of the ore presents no serious difficulty. The value of the property depends then on the *average* assay of the ore, and this has not yet been determined with any degree of accuracy.

Assays run all the way from §3, in rather lean-looking quartz, to §80 in solid pyrites. Samples of the ore, which seemed about the average, assayed in the Government Laboratory, yielded §8 to §9 to the ton in gold and silver.

These claims lie to the south of the *D.L.S.* group, across a narrow valley, through which a small stream flows south-westerly, draining Paradise lake; the claims are reached by a good trail from Bear lake. A considerable amount of work has been done on two quartz veins, and, as these veins lie in the same general direction as the veins on the *D.L.S.* group, it is probable that they are a continuation of the *D.L.S.* veins, or at least are on the same line of fracture which runs through the granitic country-rock.

There were a number of mine buildings on the property, but, as no work has been done for several years, the houses are in a state of ruin and the underground ladders are in many cases unsafe.

The fissured zone runs directly up the steep mountain-side on to the southern slope, where other prospect claims have been staked.

Work has been done at many points on the claims, prospecting the outcrops of quartz veins by small shafts, drifts, and surface workings, but the greatest expenditure has been incurred in running a long tunnel on a small quartz vein the outcrop of which is seen on the surface.

The portal of the tunnel is at an elevation of 400 feet, and the tunnel runs nearly straight in a south-easterly direction for 1,030 feet; for its entire distance the tunnel follows a quartz vein which varies in width from a few inches to 3 feet. At 100 feet in, a drift has been run to the left for 50 feet, on an offshoot from the main vein. The vein starts with a width of 4 feet, but narrows to 6 inches of white quartz at the face; the mineralization is pyrite which gave 0.5 oz. gold in selected samples.

At 160 feet in, an upraise had been driven to connect with a shaft sunk from the surface about 60 feet above; short drifts have been run and stoping done at this point, showing the width of the vein to be from 2 to 3 feet.

There are four more short raises from the tunnel and two winzes; the latter were full of water, and it was not feasible to examine the former owing to the condition of the ladders.

The vein is well defined for the entire length of the tunnel and varies in thickness from a few inches to over 4 feet; the mineralization is pyrite; the best ore is where the vein is widest, the narrow portion being barren white quartz. Samples of the best ore ran over an ounce in gold, with a little silver, but it would take careful sampling to determine the average value of the vein.

PORTLAND CANAL MINING DIVISION.

REPORT BY JOHN CONWAY, MINING RECORDER.

I have the honour to submit herewith my annual report for the Portland Canal Mining Division for the year ending December 31st, 1912.

The most important feature of the year's development was the commencement in October of a drainage-tunnel on Glacier creek by the Portland Canal Tunnels, Limited. The site of the tunnel is immediately above the concentrator of the Portland Canal Mining Company, and is to be driven a distance of about 2,000 feet. This it is expected will tap, at depth, the main

fissured zone, upon which are located some of the most important mineral properties in the camp, such as those of the Portland Canal Mining Company, Stewart Mining and Development Company, Glacier Creek Mining Company, Portland Wonder Mining Company, "O.K.," and the group of claims owned by the Pacific Coast Exploration Company.

The tunnel will be of a sufficient size and capacity to amply fulfil the objects of its construction, which may be briefly summarized as being the accommodation of all probable future traffic, and the providing of drainage, ventilation, and the most economical means of development for all properties in the main fissured zone.

The Red Cliff Mining Company shipped 1,219 tons of copper-gold ore to the Tacoma smelter, but the returns did not warrant further shipments under existing transportation facilities and the mine closed down the beginning of October.

On Salmon river, three companies—viz., the Salmon-Bear River Mining Company, Cascade Falls Mining Company, and Indian Mines, Limited—continued operations during the greater part of the year, but in each case with only a small force of men.

A number of placer leases have been staked during the past season on Bear river, extending south from the mouth of Bitter creek; twelve leases have been granted. The ground is all flat river-bar, no benches, having a width of approximately half a mile. The river-channel winds from side to side of the valley and is liable to change its location at any run of high water. Considerable work was done by the lessees on one of the claims to ascertain, if possible, whether the ground would show sufficient values to warrant testing it by the usual drilling methods. To this end some fifteen pits were sunk to a depth of from 4 to 8 feet, and two shafts to a depth of 23 feet and 18 feet respectively. Five of these holes were sunk as close to the present channel as possible, and fair prospects found in each case from the surface, while samples taken from the bottoms of the holes are said to have ranged from 23 cents to \$6 per yard. The other holes were sunk farther back from the river, on higher ground, and each sunk to a depth of about 8 feet; there were a few fine colours to a depth of about 6 feet, while samples panned from the bottoms gave from 60 cents to \$5 per yard. Still farther back from the river and in fairly heavy timber a shaft was sunk 23 feet. The upper portion of this panned a few fine colours from the surface until the water was struck, when about a yard of gravel was hoisted before the water drove the men out. A sample taken from this and carefully panned, I am told, gave \$14 to the yard. Another shaft was sunk 18 feet, when water was encountered; bailing and a small hand-pump made no impression on it, so the work had to be abandoned until water conditions were more favourable. These shafts will be sunk this winter during low water in the river if the drainage through the gravel is small enough to permit.

It is reasonable to suppose that the gold on Bear river has been brought down by Bitter creek. A discovery claim was staked on the South fork of Bitter creek in April, 1912, by L. Anderson and F. G. Hanford, which was immediately followed by the staking of the whole of Bitter creek. The only work done was by Anderson and Hanford, who, after staking and prospecting the ground with fair results, put in 60 feet of sluice-boxes. To obtain a sluice-head they used 300 feet of 9-inch canvas hose to carry the water from farther up the creek.

They sluiced for about a month under difficult conditions, the snow being about 4 feet deep and the water low on the start, and were compelled to quit on account of the high water. During the month they took out \$100 in fairly coarse gold. Work having then to be abandoned, a lay-over was granted until September 15th.



Princess Royal Island—Surf Inlet.



Princess Royal Island—Tunnel of Surf Inlet Gold Mines, Ltd.

On resuming work in the fall, it was thought best to attempt to reach bed-rock, and with this end in view a shaft was started on a bench some 25 feet above and 75 feet back from the creek-bed. This was sunk 35 feet, when water was encountered in such quantities that it would necessitate pumping machinery; consequently the work was stopped. The gravel is uniform, with only an occasional boulder large enough to need bulldozing. It prospected a few colours to the pan all the way down, with a marked improvement in the bottom where the water was struck.

It was then decided to try to get some depth in the creek-bed. A wing-dam was thrown in and the water diverted to another channel. They then ran an open-cut for a distance of 75 feet, obtaining a depth at the face of about 6 feet, and a further 3 feet was sunk to water. Contrary to expectations, this creek-bed gravel only prospected a few very fine colours to the pan. Another shaft is now being sunk farther down the creek.

There was a large falling-off in the number of prospectors in the camp as compared with the season of 1911, but assessment-work on claims held by individuals has been well kept up, and in most cases with gratifying results.

MAPLE BAY.

On the *Comstock* group a series of open-cuts and stripping was recorded.

Application for certificate of improvements has been made on the *Princess* group, owned by Collison & Noble.

GEORGIA RIVER.

On the *John D.* group the shaft was sunk a further 15 feet and a drift of 6 feet made; at this depth a vein of free-milling gold was encountered, a picked sample of which gave high values of gold per ton.

MARMOT RIVER.

The *Wire Gold* group, consisting of nine claims, was recorded in November by G. W. Bruggy and associates. This group is situated on the north side of the river, less than two miles from tide-water; the ledge, which is free milling, is about 6 feet in width, runs in a northerly direction, and can be traced on the surface for three claim-lengths. The gold is in white quartz lying between porphyry walls; surface assays gave good gold values. A tunnel has been driven on the lead for a distance of 40 feet; the ore at the face carries high silver values, in galena, as well as the streak of 30 inches which is free milling. Work has been closed down for the winter and operations will be resumed as early as possible in the spring.

On the *Golden Star* group a series of open-cuts and 17 feet of tunnel has been recorded.

SALMON RIVER.

The Salmon-Bear River Mining Company recommenced operations early in the spring, and, owing to a new discovery made soon after resuming, the company gave all its attention to the opening-up of the new ore-body, the character of which is a high-grade silver-lead carrying good gold values. The nature of the work consists of a number of open-cuts across the vein, which, in some instances, is 25 feet in width, exposing the vein down the trend for several hundred feet. A tunnel was driven in on the vein to intersect the ore-shoot exposed on the surface, and the ore was encountered at a depth of 200 feet. A crosscut has been run at this level 40 feet across the ore-body. The company is at present making plans for development on a larger scale in the coming spring.

The Indian Mines, Limited, owns a group of four claims situated on the west side of Cascade creek, about three miles above its confluence with the Salmon river, and about fifteen miles up the Salmon River valley from tide-water. It is now easily reached by an excellent

horse-trail constructed during the past season by the Government. Supplies can now be delivered at the property for 4 cents a pound, as against 12 cents a pound a year ago. The first twelve miles of this trail is practically level, the elevation at "Twelve-mile" being 323 feet above sea-level, and offers no difficulties to the construction of a wagon-road or a railroad. The property is heavily timbered and ample water-power can be developed for any mining or milling operations.

The vein has been traced on the surface for over 1,000 feet and is well defined. It appears to cross, diagonally, a wide diorite dyke which intrudes the predominating greenstone schists. Two open-cuts have been made across the vein, showing it to be from 18 to 20 feet in width. The higher cut exposes about 8 feet of solid galena, the remaining 12 feet being quartz heavily mineralized with galena and iron.

Another cut, 300 feet south, across the face of the bluff, shows the vein to be 18 feet wide, 12 feet of which carries gold, silver, and lead.

A tunnel is being driven to get under these surface showings. It is now in 200 feet, and will have gained a depth of 150 feet when under the galena showing. The vein was encountered at 110 feet from the mouth of the tunnel, showing from 2 to 4 feet of ore assaying well in gold, silver, and lead. This was drifted on for 20 feet, when a shattered portion of the vein was entered and continued in for 40 feet, in which there were little or no values. In the last 30 feet the vein has become well defined, and a crosscut at the face, not yet to the foot-wall, shows it to be over 15 feet in width, of which there is 6 feet on the hanging-wall of good milling-ore. As the tunnel has to be driven about 125 feet yet to get under the big surface showing, the present indications are encouraging.

Another tunnel has been started farther down the hill (about 150 feet vertically), and driven in some 40 feet as an open-cut. This is following a well-defined hanging-wall, next to which is a fairly soft filling carrying no values. This, however, is cutting out, and the face of the tunnel shows 2 feet of ore carrying gold, silver, and lead. (Report furnished by G. A. Clothier, B.Sc., superintendent.)

The Cascade Falls Mining Company continued development during the year with a force of three men; the work consisted of a series of open-cuts, stripping, and other surface work.

On the *Finland Girl* group of four claims the work recorded was six open-cuts, totalling 90 feet in length, and 44 feet of tunnel.

Lucky Swede group of four claims, series of open-cuts and 36 feet of tunnel.

Cosmopolitan group of five claims, series of open-cuts and 16 feet of tunnel.

Big Missouri group, series of open-cuts.

Yellowstone group, series of open-cuts and surface stripping.

Flossie group of eight claims, twelve open-cuts in rock and 10 feet of tunnel.

The Hercules Mines, Limited, recorded 22 feet of tunnel on the *Martha Ellen* group.

On the *Ladybird* group of four claims, owned by R. Cameron and associates, a series of open-cuts has been recorded; the work done has shown up a lead of high-grade galena carrying high silver values. This property has been bonded to H. E. Cassels, of New York, and the first payment made.

BEAR RIVER.

The *Red Reef* group, consisting of *Red Reef Nos. 1, 2, 3, 4, 5, 6, 7,* and *Red Reef Fraction*, is situated on the east side of the mouth of Bear river and within one mile of the Stewart townsite.

During the summer of 1910 sufficient work, consisting of surface work and two short tunnels, was done on *Red Reef No. 1*, to obtain Crown grants on Nos. 1, 2, 3, 4, (and the fraction, but owing to litigation little work was done in 1911.

Work was recommenced in July, 1912, and the first month was spent in open-cutting the large mineralized zone on *Red Reef No. 5*. Later a pack-trail was built to the property and a cross-cut tunnel was commenced on *Red Reef No. 3*; this has been driven for a distance of 225 feet; the ore being encountered at 200 feet; a drift from the main tunnel has been run 50 feet to the north to tap a small vein running in an easterly and westerly direction; a tunnel, to tap the ore at 100 feet lower than the main tunnel, is now in 45 feet and is being extended for an additional 100 feet. Some 500 feet to the south of the main workings an independent 40-foot drift has been driven on the zone.

The ore is a white quartz, with pyrrhotite, chalcopyrite, and small values in gold and silver. The mineralized zone, which appears to be not less than 100 feet wide, runs the whole length of the property and is heavily impregnated with mineral throughout. The zone is crosscut by several veins carrying fairly good-grade ore.

The property is owned and operated by H. E. Newton, of Victoria, and from six to thirteen men have been employed on the property continuously since July, 1912.

The Portland Bear River Mining Company recorded a series of eleven open-cuts in rock and a large amount of surface stripping on the *Bear River* group, and 91 feet of tunnel on the *Ruby Fr.* group.

On the *Victor* group of three claims 30 feet of tunnel and two open-cuts were recorded.

The *Mountain Chief* group, situated on the west side of Bear River, owned by Wm. Forrest and associates, was located in August, 1911; the work done consists of a series of open-cuts. There are several veins on the property, all of which carry high gold and silver values.

On the *Franklin* group the work recorded was 18 feet of tunnel and open-cuts.

On the *A.A.* group 30 feet of tunnel and open-cut work was recorded.

Red Cliff Mining Company's superintendent reports as follows:—

Total amount of new work for the year represents 4,205 feet. Out of this, the 400-foot level claims 1,240 feet, consisting of crosscuts, drifts, and 100 feet of chute-raising; this latter work for the purpose of facilitating stoping. Much of this work has been in ore varying in quality, but, taking the high grade with the low, could all be smelted profitably, provided any reasonable economic smelting conditions were available. On this level we have now exposed ore-shoots with a length of over 250 feet and an average width of 20 feet, although in places over 50 feet wide; by far the greatest tonnage yet exposed in the mine is on this level; here the ore-bodies appear to be merging into one big body, while on the levels above they are widely separated.

On the 300-foot level there are 800 feet of drifts and crosscuts; all this is new work, having been opened up during the year. There are two distinct ore-bodies exposed on this level, one through which the old raise passes, and on that account it has not had much done to it, and the other 100 feet on the north side of the same raise; the latter we were drifting on when machines were laid off. Situated as it is directly over the 400-foot ore, it is no doubt part of the same ore-body.

On the 200-foot level, the 300 feet of new work comprises chute-raises into the No. 1 ore-body and drifts and crosscuts opening up the No. 2 ore-body.

The 100-foot level has had an increase of new work amounting to 1,160 feet, consisting of an extension of the main tunnel south-westerly of "B" and McPhee's drift north-westerly, crosscuts from these drifts north-easterly, and a drift on the No. 2 ore-body connecting "B" and McPhee's drifts. It was from this ore-body that much of the ore was extracted for shipment. A new tunnel 80 feet long was driven from a point 120 feet in the old tunnel, with an outlet of 75 feet farther to the south of the old portal; this was to take the place of the old outlet, which is all in ore and must eventually be stoped out, rendering it useless as a working-tunnel. The new tunnel is in a much better position, being away from the course of snowslides.

Upper tunnel: 400 feet of tunnelling and crosscutting has been done in this level for the purpose of locating the southerly ore-body and more accurately determining its strike and dip. It accomplished its object, but developments were not as satisfactory as anticipated; for when finding the ore at this depth, although of excellent quality, there was not so much of it as was expected, judged from the promising outcrops 100 feet above; possibly where intercepted it had pinched and may yet open out again much larger on the levels below; to prove this, work was being done on the 100-foot level.

Other work consists of a new main raise, run from the 400-foot to the 100-foot level; the last portion of this, between the 200-foot and 100-foot levels, was timbered and is used as a manway, skipway, and ore-chute, a new hoist having been installed on the 100-foot level to handle mining material through this raise.

On the *Waterloo* claim a very large ore-body has been stripped and shots put into it at intervals across 200 feet, proving (as far as surface work can prove) this to be a very large low-grade proposition and a very valuable asset to the company, provided that a cheaper method of transportation and smelting is secured; a few hundred feet south-east of where work has been done on this showing is situated the large body of iron-sulphide ore carrying exceptionally high values in gold.

When shipments were being made, 5,000 tons of ore was broken, 1,249 tons have been shipped, 1,500 tons remain in the stopes, and 2,239 tons were put on the ore-dumps, as the value of the latter, without sorting, was too low to ship under present smelting conditions, and sorting was out of the question without sorting facilities.

The work of the past year has proven the permanency of the *Red Cliff* ore-bodies, as on the 400-foot, the lowest in the mine, there is much more ore in sight than on any other level, and the values with depth are holding their own. (Report furnished by H. Neil Smith, superintendent.)

GLACIER CREEK.

On the *Evening Sun* group, owned by Rush & Bagg, 115 feet of tunnel has been driven during the past season; 7 tons of No. 1 ore was sacked ready for shipment, but owing to the heavy fall of snow it was found impossible to get horses to the property.

On the *O.K.* mine the tunnel has been extended a further 50 feet by the owner, J. Perrault.

On the *Portland* group, formerly the property of the Portland Wonder Mining Company, but now owned by the Mount Gladstone Mining Company, 45 feet of tunnel was recorded.

On the *Florence* and *Leadville* claims, owned by J. A. Harper, 80 feet of tunnel was recorded.

On the *Ruth* and *Francis* group, 64 feet of tunnel has been recorded by the owners, Nesbitt & Archie.

On the *Lake View* group, owned by McKay & Bibeau, the work recorded was 22 feet of tunnel, 15 feet of shaft, and open-cuts.

The drainage-tunnel of the Portland Canal Tunnels, Limited, was commenced in the beginning of October; the size is 7 x 7 feet in the clear, and it is now in a distance of 120 feet. The company has a force of twenty men employed and is working two machines, the compressor of the Portland Canal Mining Company supplying compressed air.

BITTER CREEK.

On the *Old Chum* group the work recorded was 30 feet of tunnel and four open-cuts.

On the *War Eagle* group the work recorded was 30 feet of tunnel.

AMERICAN CREEK.

The group of nine claims formerly owned by the Northern Terminus Mines, Limited, was purchased at a sheriff's sale last June by Neil McL. Curran, acting as agent for the Pacific Coast Exploration Company, Limited. The development-work under the new management is 335 feet of tunnel and drifts and a shaft sunk to a depth of 50 feet. This property has closed down for the winter months, but operations will be resumed as soon as possible in the spring.

On the *Lipton* group, owned by Wm. Spurek, the work recorded was 34 feet of tunnel.

On the *Bonanza* group, consisting of four claims, a considerable amount of development-work has been done during the past season under the superintendency of T. J. Vaughan Rhys, M.E.; a number of open-cuts in rock and 75 feet of trenching have been recorded.

OFFICE STATISTICS—PORTLAND CANAL MINING DIVISION.

Free miners' certificates (individual).....	280
" " (company).....	9
" " (special).....	1
Mineral claims recorded.....	178
Placer claims recorded.....	22
Certificates of work issued.....	512
Bill of sale, etc., recorded.....	77
Filings.....	39
Certificates of improvements recorded.....	27
Placer leases granted.....	12

Revenue.

Free miners' certificates.....	\$2,195.25
Mining receipts, general.....	3,759.75
Other sources.....	1,422.50
Total.....	<u>\$7,377.50</u>

QUEEN CHARLOTTE MINING DIVISION.

REPORT OF E. M. SANDILANDS, GOLD COMMISSIONER.

I have the honour to submit the annual report on mining operations in the Queen Charlotte Mining Division for the year 1912.

The head office of Gold Commissioner was moved from Jedway to Queen Charlotte City, on Skidegate inlet, and a new office opened here on May 15th last.

Mining in general has been very quiet this past year, there being very few inquiries for copper properties, in spite of the high price of metals. Very little prospecting has been done, and assessments only have been kept up on claims having the most promising showings. No ore was shipped from this Division this past year.

COLLISON BAY.

No work of any account has been done this past year in this locality. The *Meal Ticket* group had the assessment done, but nothing more. Several other claims had from two to three years' work done on them.

IKEDA BAY.

At the *Ikeda* mines no work was done, with the exception of assessments on un-Crown-granted claims. The main group of claims has been Crown-granted.

HARRIET HARBOUR (JEDWAY).

On Copper island, in Skineuttle inlet, owned by A. Heino, a force of about ten men was regularly employed; the chief work being the sinking of a shaft. Ore of a good grade was encountered in the bottom of the shaft and shipments are expected shortly. An air-drill and compressor have been installed and new buildings have been erected.

On George island, adjoining the above-mentioned island, W. H. Campbell has some good showings of high-grade ore and has a few tons ready for shipment.

Nothing but the usual assessment has been done on the *Copper Queen* group, owned by J. S. McMillan.

HUSTON INLET.

Thompson & McKinnon have done considerable work on their property at the head of Huston inlet, called the *Ivan* group. A tunnel has been driven in some 70 feet, with a large showing of fairly good-grade ore.

On the *Hercules* group H. McEachern and others have done considerable work and have encountered some good showings of chalcopyrite.

LOCKEPORT.

E. M. Morgan and associates have had three groups of claims under working bond the past year—namely, the *Montana* group, owned by Andrews & Dunn; the *McGuire* group, owned by F. C. Elliott and others; and the *Aper* group, owned by Harris, Bell & Davies. On each of these groups from eight to ten men have been continuously employed, doing development-work, etc., and, up to the time of writing, with fairly good success.

No work, with the exception of the assessments, has been done on the *Suede* group this year. There is a rumour of this property changing hands and of work starting up again on it.

TASU.

A working bond has been taken on Gowing & Jones's claims in Tasu, and at present a small force of men is at work testing the property with a view to more extensive development. The parties having the option are Seattle people.

CUMSHEWA INLET.

The Queen Charlotte Mining and Development Company, which owns the *Homestake* group in Cumshewa inlet, has operated continuously this past year, employing on an average about twelve men. The company has driven some 600 feet of tunnel, put up 170 feet of raise, sunk some 50 feet, and built half a mile of wagon-road from the mine to the beach. The best of the ore is being sacked and will be shipped later on; the ore carries high gold values. Extensive operations are expected the coming summer.

On Louise island, on the opposite side of the inlet, some work has been done on a group of claims having a large showing of high-grade iron-ore, and a drill is expected to be installed on the property shortly.

Two core-drills have been in operation the past summer drilling for coal, one on Yakoun river, under the management of W. L. Barton, and owned by the Graham Island Collieries, and another owned by the Graham Island Coal and Timber Company and under the management of F. C. Greene. Speedy progress has been delayed by the difficulties in getting in supplies and machinery.*

Boring for oil still continues at Otard bay, on the west coast of Graham island; McPhail & Stewart having charge of the operations. These people have had many difficulties to contend with in the way of getting in machinery and supplies, and deserve great credit for the manner they have continued the boring under such hard circumstances. The Government has built and improved the present trail from Naden harbour to the west coast.

OFFICE STATISTICS—QUEEN CHARLOTTE MINING DIVISION.

Claims recorded (quartz).....	90
Certificates of work issued.....	159
Certificates of improvements.....	47
Bills of sale.....	33
Free miners' certificates issued.....	126

Revenue.

Free miners' certificates.....	\$ 690 25
Mining receipts.....	2,070 80
Other sources.....	2,783 00
Total.....	\$ 5,544 05

* NOTE BY PROVINCIAL MINERALOGIST.—C. H. Clapp, of the Canadian Geological Survey, spent two weeks this past season on the island examining the coal formation. The following extract from the "Press Bulletin" issued by the Survey refers to his work there: "It was found that the Cretaceous coals, while of excellent quality, occur in much smaller basins than was previously thought, and that the basins are deformed, and involved with later igneous rocks, which occur chiefly as dykes and sills or laccoliths and possibly as flows. However, considering the excellent quality of the coal, many of the basins are well worth further prospecting."

The Graham Island Coal and Timber Company has moved its drills as near to the outcrops at Camp Wilson as the property admits, and will endeavour to pick up the coal-seam there and trace it farther.

OMINECA MINING DIVISION.

REPORT BY W. ALLISON, GOLD COMMISSIONER. (OFFICE AT HAZELTON.)

I have the honour, as Gold Commissioner, to submit the annual report for the Omineca Mining Division for the year ending December 31st, 1912.

With the advent of the Grand Trunk Pacific Railway into Hazelton in the fall, and the consequent lowering of freight rates, considerable outside interest has been manifested, and preparations for development-work on a larger scale have been made by owners hitherto content with doing merely the necessary assessment-work.

A new era in the development of the district commenced with the shipping by the *American Boy* mine last month of the first car-load of ore, while a further 250 tons is now at the station awaiting shipment.

 GLEN MOUNTAIN.

This silver-lead property has been actively developed during the past **Silver Standard** year with very gratifying results, and about ten car-loads of ore have **Group.*** recently been hauled to the station for shipment. The main, or No. 2, shaft has been sunk to a depth of 262 feet and drifts were started at the 150-foot level, where the ore shows a width of 9 feet, and a station is being cut at the 250-foot level. A compressor has been installed and drills will be in operation early in 1913.

About 350 feet east of the No. 2 shaft surface prospecting opened up a fine showing of ore, and a crosscut will be driven from the 250-foot level of the No. 2 shaft to the new vein known as No. 3.

Some 400 feet east of No. 3, a strong vein (No. 4) was found showing very rich ore, but little work was done on this.

On No. 1 vein, 300 feet west of No. 2 vein, considerable surface work was done during the summer, and a large and continuous ledge of quartz carrying more or less ore uncovered. Assays of picked samples taken while the ore was being taken out of the shaft during sinking show values of from \$100 to \$600 per ton of 2,000 lb.

The property is well equipped and the owners plan to do extensive development-work as rapidly as possible, while extracting the ore in sight.

Canadian King Group.—Little has been done on this group during the past year, but considerable work is planned for the coming year on the veins known to exist.

Surprise Group is a northerly extension of the *Silver Standard* group. Surface work on this property has disclosed five parallel veins, all of which carry more or less galena. In June, after considerable work in stripping the outcrops, a crosscut tunnel was started with the object in view of cutting all five veins. This tunnel is now in 450 feet and is being vigorously extended.

Some twenty new locations have been made on this mountain.

NINE-MILE MOUNTAIN.

The many evidences of mineralization all over this mountain and the good surface showings, in places, still attract a great deal of attention; new locations to the number of sixty-six being recorded during the year.

The trail along Two-mile creek to the north side of the mountain has been converted into a good wagon-road for a distance of six miles.

Owned by the Harris Mines, Limited. This property has been under **American Boy** steady development during the past year and has now reached the shipping **Group.** stage. The shaft on the No. 1 vein has been deepened from 37 feet to the 185-foot level. There is ore all the way down, varying in width from 18 inches to 5 feet, the average values being about \$45 to the ton. From the 110-foot level a drift has been started to the north and will be continued until it reaches a shoot of ore which shows on the surface, 70 feet north of the shaft. This shoot of ore is 40 feet in length, and a general sample of 2 feet 6 inches of ore gave returns as follows: Gold, 0.08 oz.; silver, 192.5 oz.; lead, 31.7 per cent.

No. 2 vein was opened up by crosscut tunnel 340 feet in length, which tapped the vein at a vertical depth of 110 feet; some 80 feet of drifting was done, the vein being mineralized throughout and of an average width of 3 feet. Drifting will be resumed later to locate the ore-shoot.

*See also notes by Provincial Mineralogist following the report.



Groundhog Mt.—Trail over Summit in Midsummer.



Camp at McEvoy Flats—Groundhog Confield.

No. 3 vein has been developed by the inclined shaft on the vein being deepened from 27 feet to the 185-foot level. Drifting at this level has exposed some nice ore at different points, the vein being about 2 feet in width in the face of the drift.

No. 4 vein has been stripped and a fine shoot of high-grade ore exposed.

About 200 tons of ore has been taken out in the course of development, and a car-load of 25 tons of sorted ore has recently been shipped to the Trail smelter, returns from which have not yet been received.

Silver Cup Mines, Limited.—This property has remained idle during 1912, but, in view of the reduced cost of supplies consequent on the advent of the railway and the extension of the Nine-mile wagon-road, arrangements have been made for a resumption of work during the coming year.

Owned by the Hazelton Nine-mile Mining Company, Limited. Work on these claims has been confined to a 40-foot shaft and a drift 30 feet long.

Lead King Group. It is unfortunate that the finances of the company have not permitted of a more vigorous development of this promising property.

Silver Cup Extension Group.—During the year a 34-foot tunnel has been driven and several open-cuts made.

Silver Pick Group.—The tunnel on this property has been extended and the vein further opened up by means of rock-cuts and surface stripping.

The usual annual assessment-work has been recorded on a great number of claims, many of which show promise, but these are too numerous for individual mention.

ROCHER DÉBOULÉ MOUNTAIN.

The very encouraging developments taking place on the claims owned by the Rocher Déboulé Copper Company, Limited, have induced very close prospecting on this mountain, and many new locations have been made both on the Juniper Creek side and at the headwaters of Mission and Mud creeks, the fissures having been traced over the divide. Some promising claims were also staked on the Skeena side of the mountain, so that the mineralized area is now proved to extend for several miles in all directions from Juniper basin, where the original discoveries were made in 1910.

Owned by the Rocher Déboulé Copper Company, Limited. There are

Juniper Group. four veins on this property on which work has been done. No. 1, the lowest on the mountain, being at an altitude of 4,780 feet, and No. 4, the highest, 5,600 feet. Vein No. 1 is really two adjacent veins, the first of which seems to be a replacement of the granite by chalcopyrite; considerable quartz is also in the vein, which in the crosscut is 8 feet wide.

The second vein lies directly on the hanging-wall side of the first; it is apparently a fissure filled with quartz carrying grey copper, galena, and zinc-blende. A crosscut tunnel 185 feet long was driven to tap this vein, which was then drifted on both east and west, and a raise of 61 feet put up. The crosscut exposed 8 feet of low-grade copper (1½ per cent.) and 4 inches of grey copper. The raise was connected with the Trimble drift above, where chalcopyrite shows for a length of 35 feet.

On veins Nos. 2 and 3 comparatively little has been done.

Vein No. 4 is a very strong fissure cutting the formation for several miles. Strike, S. 75° W.; dip, 65 degrees to the north, or into the hill. It is on this vein that attention has chiefly been bestowed.

The main workings consist of a short shaft, a tunnel, and a long drift. At station No. 2, 2 feet of ore was cut, assaying about 12 per cent. copper and §10 in gold. This ore continued for 47 feet between stations Nos. 2 and 3. A raise was driven from station No. 2, 27 feet to the surface, showing good ore all the way and averaging 2 feet wide; 200 feet east of this point a surface cut was made on the vein, showing 3 feet of excellent ore containing some native copper; assays of this ore are not available.

The winze from the Pemberton tunnel was started on 6 feet of ore, which gradually widened in 20 feet to 9 feet 4 inches, then pinching to 4 feet at the bottom, 37 feet deep. The raise connecting with this winze shows the ore to pinch to a few inches, and then widen to 2 feet 6 inches at the cliff-tunnel level, 102 feet perpendicularly lower. The ore assays high in copper, with good values in gold and silver. The exact length of this ore-shoot has not yet been determined.

Between stations Nos. 7 and 10, 25 feet of ore was found 3 feet wide. From here on the vein showed ore at various times, but no regular ore-shoot was found until 30 feet past station No. 11. The ore here is 5 feet 6 inches wide, and with 35 feet of drifting still holds good. Assays are not yet to hand, but it carries considerable copper. This is 113 feet perpendicularly below the collar of the shaft, or about 125 feet on the vein.

The shaft was started on 5 feet of ore, which widened to 6 feet at the bottom, 35 feet deep. The entire shaft averages well in copper, with good values in gold and silver. A total of 1,359 feet of development-work has been accomplished.

Highland Boy Group.—These claims adjoin the *Juniper* group to the north, and have been prospected by means of open-cuts and surface stripping. The property has just been taken over by a newly organized company—the Butte-Rocher Déboulé Copper Company, Limited—and active development-work will be undertaken in the spring. The fissures on the *Juniper* group have been traced through this property, which has excellent surface showings.

Great Ohio Group.—This property adjoins the *Juniper* group to the east, and was located by the same prospectors. Development has been chiefly confined to open-cuts and extensive stripping, the main fissure having been proved for over 3,000 feet, the ore exposed giving promise.

Amaryosa Group.—Adjoining the *Great Ohio* group, the big fissure vein from which, striking perpendicularly through the mountain, passes through two of the claims in this group. There are two other veins known on this property from 4 feet to 9 feet wide, the lower disclosing chalcopyrite assaying 2 per cent. copper.

Copper Hill Group.—Some nice ore has been exposed on this group, the work consisting of 40 feet of tunnel, some ten large open-cuts, and several hundred feet of stripping.

On the Mission creek side of the mountain the *Reservoir* group and *Ingenika* group were only located during the summer.

Some 116 new locations on Rocher Déboulé mountain were recorded during 1912.

HUDSON BAY MOUNTAIN.

This promising district has, hitherto, been greatly retarded owing to the difficulties of transportation, but with the assurance of the Grand Trunk Pacific Railway running into Telkwa early in the spring of 1913, greater activity may be looked for.

Coronado Group.—A crew of six men was engaged on this property for some time, and, as a result, the showings have considerably improved. A 50-foot tunnel opened up a 4-foot vein of galena-ore of exceptionally high grade.

Hudson Bay Mountain Mining Company, Limited.—This company is driving a long crosscut tunnel, which, when completed, will give a depth of several hundred feet.

Assessment-work was recorded on the following groups, in addition to numerous individual claims: *Silver Creek, Empire, Victory, Dominion Day, Extension, Moonshine, Buckhorn, White Swan, Humming-Bird, Last Chance, Iron King, Anaurus, Surprise, Groundhog, and Cascade.*

New locations to the number of fifty-one were recorded.

BABINE RANGE.

Prospecting was very active in this section, forty-eight new locations being recorded. The better-known properties, however, are still awaiting more favourable transportation facilities, and nothing beyond the necessary assessment-work has been attempted.

TELKWA.

There are many properties tributary to this point which are being slowly developed, and on the Morice river a new discovery was made of some large bodies of zinc-ore, carrying some values in silver and copper.

KITSALAS AND ZYMOETZ RIVER.

The claims in this district are still mainly in the hands of prospectors and very little serious development-work has been attempted, although surface showings are in many cases of a highly encouraging nature.

PLACER-MINING.

The Cassiar Hydraulic Mining Company, Limited, has installed on Gold creek, Kitsalas, a complete hydraulic plant, consisting of a 40-inch Sampson turbine water-wheel, Worthington pump, flumes, penstock, etc., and a 12-inch pipe-line carrying water to the "giants." The plant has been tested and found entirely satisfactory and will be operated during the coming season.

In the Omineca River district there has been very marked activity, thirty-eight new leases being taken up and many transfers taking place, the tendency being for the consolidation of leases in financially strong hands, owing to the necessity of installing heavy machinery.

COAL.

Of the numerous evidences of coal in this district the only proven deposits of a coking quality are on Coal creek, at the headwaters of Zymoetz (Copper) river, where seventy-five sections are owned by the Copper River Coal Claims, Limited.

On the seam known as the "Main," coal is exposed in a tunnel on the east side of Balsam creek, in which 5 feet 10 inches of steam-coal was recently reported. Further work, however, has shown an additional 4 feet 3 inches of coal above what was supposed to be the roof. This addition to the seam is evidently persistent, as it has been exposed at two points in the tunnel.

The "Six-foot" seam, which outcrops on both sides of Coal creek, has now been defined on both sides of Balsam creek by means of a drift 172 feet from Coal creek, and a tunnel on the west side of Balsam creek. It is a clean, coking-coal.

On the No. 1 seam, two 45-foot levels have been driven, showing 3 feet of first-class coking-coal, with an exceedingly low percentage of ash.

Samples of coal from all the seams on the property have been analysed and not a single sample returned more than 1 per cent. of sulphur.

Exploration-work, as far as tunnels are concerned, has practically reached its limit, and further prospecting to test the acreage and the continuity of the seams will be done by drills.

* *Anthracite Coal*.—The interest aroused in the Groundhog anthracite coalfield has been maintained, and considerable work and further prospecting has been done. In addition, some of the holdings have had the benefit of expert examination and report.

The B.C. Anthracite Coal, Limited, ran some seventeen tunnels on their claims, varying from 20 to 250 feet in length.

On the Murdoff & Williams claims, the Lindsay group, Canadian Mining Operators, and Laidlaw's claims, men were employed in stripping and making open-cuts and other necessary work of an exploratory character.

The Western Development Company, Limited, and the B.C. Anthracite Syndicate were not working this past season.

OFFICE STATISTICS—OMINECA MINING DIVISION.

Free miners' certificates (individual)	1,023
" " (special)	6
" " (companies)	6
Mineral claims recorded	678
Certificates of work issued	658
Placer claims recorded	4
Agreements and transfers	203
Placer-mining leases granted	38

Revenue.

Free miners' certificates	\$ 5,391 75
Mining receipts, general	8,638 70
Total	\$14,030 45

*See report of Provincial Mineralogist on pages 81 *et seq.*

OMINECA MINING DIVISION.

NOTES BY PROVINCIAL MINERALOGIST.

Passing through Hazelton on the return from Groundhog, the **Silver Standard Mine.** Provincial Mineralogist rode out to the *Silver Standard* to observe the development since his last visit to it, as described on pages 99 *et seq.* of 1911 Report. The property is about five miles from the old town of Hazelton and about six miles from the nearest point on the Grand Trunk Pacific Railway. The property is held by Stewart, Welch, McLeod, and associates, and the work was being done under the direction of W. S. Haskins, formerly of Rossland.

The shaft, which in 1911 was down 25 feet, had been continued, in September, 1912, to a depth of 200 feet, and was equipped with small hoisting-engine and boiler, and with a pump in the shaft. The shaft is 6 x 10 feet in section and dips at an angle of about 60 degrees into the hill; drifts each way had been broken away at the 150-foot level, but had not been driven any distance.

The vein, carrying ore, continues for the full depth of the shaft, except for a few feet at the bottom, where the vein seems to have taken a flatter dip, and, as the shaft was continued at the regular angle, the vein disappears into the hanging-wall, where no doubt it will be found to be continuous.

The vein has thus been developed to the depth of the shaft, in which its thickness varies from 2 to 6 feet, averaging about 4 feet, but the lateral dimension of the ore-shoot has not yet been proved; on the surface this is only shown to be from 30 to 35 feet, so that drifts will have to be run before ore can be claimed to be "blocked out."

The vein is very well mineralized with galena and zinc-blende; the extent of the mineralization may be indicated by the statement that from the shaft-sinking there has been produced from 300 to 350 tons of first-class ore which would run somewhere about 30 per cent. lead, 20 per cent. zinc, 125 oz. silver, and from \$3 to \$5 in gold; in addition to this, there is about 70 tons of second-class ore and some 200 tons of third-class ore, which, it is calculated, would concentrate about 5 into 1.

While these shaft-workings have developed a very promising body of ore, the management, in its recent prospecting in the vicinity of the shaft, has uncovered another vein—a new discovery—running parallel to the shaft-rim, but some 80 feet vertically higher and outcropping 360 feet farther up the hill.

This new discovery had only been prospected by a series of trenches down to, or extending for a few feet into, bed-rock. These workings, although very superficial, have shown up an exceedingly promising ore-shoot, which, from indications, seems probable to quite eclipse the shaft and vein.

These development workings have demonstrated, with a reasonable certainty, a continuous ore-shoot from 200 to 250 feet long on the surface, with a well-defined streak of nearly solid galena, and zinc-blende with much grey copper, for this entire length, and also a further thickness of vein of from 2 to 3 feet of quartz and ore of unknown grade.

The "streak of solid ore" is good enough for the present, averaging from 18 to 20 inches in width and running from 200 to 300 oz. in silver to the ton on samples obtained along its outcrop.

Probably at no point had this ore been absolutely demonstrated for a depth greater than 3 or 4 feet, yet its promise was so good that its further development will be watched with great interest.

It is understood that this new discovery will be developed by driving a crosscut tunnel, about 360 feet long, from the 150-foot level on the shaft-workings.

PEACE RIVER MINING DIVISION.

NOTES BY PROVINCIAL MINERALOGIST.

There has been no report received this year from the Mining Recorder of the Peace River Mining Division, which is probably accounted for by the fact that mail from this district has to be brought out by dog-teams in the winter, and is at best very uncertain.

The Peace River Mining Division embraces a triangular piece of territory lying to the east of the Rocky Mountain range and west of the 120th meridian, so that geologically it is related more closely to the great plains of Alberta than to the remainder of British Columbia.

With possibly the exception of its western border, its geological conditions do not promise much prospect of producing metalliferous deposits, since any formation likely to produce metals is deeply covered with deposits of the shales and sandstones of the Cretaceous coal-bearing formation, and these in many places by still younger formations.

The Peace river itself carries a small amount of placer gold, which appears to have been carried by it through the Rocky mountains from their western side, as it is not known that any of the tributaries east of the mountains carry gold.

As was pointed out by the writer in a former report, the gold thus found is in a very fine state of division, and has not yet been found in such a state of concentration that it could be profitably worked by other than mechanical means.

It seems probable, however, that some of the bars and shoals in this river may eventually be successfully worked by dredging, to which class of work the total absence of large boulders and clay in the river-benches particularly lends itself.

As has already been said, a large portion of the area in question is covered by the Cretaceous formation, which is the formation in which, both in Alberta and British Columbia, all the commercial coal has been found.

In the Peace River Mining Division these measures have for many years been known to contain in parts deposits of coal of exceedingly good quality, which, until the probability of a railway within a reasonable time was assured, did not offer much inducement to development.

At this time, however, it does seem possible that a few years will see railways constructed into the district, when coal-deposits will be of great importance to the development of the district.

With such facts in mind, this Department, last summer, engaged the services of C. F. J. Galloway, B.Sc., of Vancouver, a mining engineer, and a British Columbia certificated coal-mine manager, to visit the field, to examine such development as had already taken place, and to report. Mr. Galloway's report is appended hereto, and, as the route is little known, the itinerary of his trip to and from the field is also given, while maps prepared by him accompany the report.

REPORT ON THE COAL-MEASURES OF THE PEACE RIVER CANYON.

BY C. F. J. GALLOWAY, B.Sc., OCTOBER, 1912.

ITINERARY OF TRIP.

Acting under instructions received from the Provincial Mineralogist, the writer, early in July, consulted with Robt. Green in Victoria, and Neil Gething in Vancouver, two of the gentlemen interested in the Peace River coal lands, as to the examination of that property, the means of transportation, etc., and was very strongly advised to take with him Geo. Henderson, of Sloean City, one of the partners, and, rather than employ Indians from Fort George or McLeod lake, who are becoming more unsatisfactory and exorbitant in their demands every year, to send for Gus Amundsen, a Norwegian living at Stuart lake, who is familiar with the Peace river and with the coal exposures. Telegrams were sent to these gentlemen, who were fortunately both able to come; Mr. Henderson proceeding at once to Vancouver, and Mr. Amundsen arranging to join the party at McLeod lake.

July 14th. The writer, accompanied by Mr. Henderson, left Vancouver by C.P.R. train at 9 a.m., reaching Ashcroft at 5.30 p.m.

July 15th. Left Ashcroft per B.X. auto-stage for Soda Creek at 8 a.m. The auto gave great trouble, finally breaking the shaft one mile from the 70-Mile House. A new shaft was wired for from Ashcroft, which arrived on a special auto at midnight.

July 16th. After a new shaft was put in the journey was resumed at 9.30 a.m., Soda Creek being reached at 9.40 p.m., after considerable further trouble from heated bearings.

July 17th and 18th. Left Soda Creek at 3 a.m. on steamer "B.X.," reaching South Fort George at 2.30 p.m. on the 18th.

July 19th and 20th. Efforts were made to find an Indian to pilot the party up the Fraser river as far as Giscome portage, a distance of forty miles, but without success, nearly all the local Indians being at work in connection with the construction of the Grand Trunk Pacific Railway.

Owing to the recent fall in the river, the B.X. Company's steamer "B.C. Express" was not going up as far as Giscome again until the river rose, but, hearing that it was going to take an excursion up as far as Willow river on Sunday, the 21st, the writer bought a canoe and the greater part of the supplies for the trip, and made arrangements to go up on the excursion.

July 21st. Travelled as far as Willow river on the steamer "B.C. Express," arriving there at 2.15 p.m. At 3.15 Mr. Henderson and the writer started lining the canoe up the left side of the river. Camp was made at 6.15 about four miles up.

July 22nd. Continued lining up-stream. Crossed to the right (north-west) bank at the foot of Giscome rapids, and lined up through the rapids, making about nine miles by 6.30 p.m.

July 23rd. Giscome was reached at 10 a.m., but, on account of the flies, the team on the portage was only being worked at night, and it was 6 p.m. when a start was made, the canoe, loaded with the dunnage, being hauled across the seven and a half miles on a specially constructed rig. Summit lake, the headwaters of the Peace river, 300 feet above the level of the Fraser, was reached at 9.40 p.m.

July 24th. Traversed the eastern arm of Summit lake, about six miles, to the outlet into Crooked river, which stream was followed down for about twenty-five miles. For the greater part of this distance the river is from 100 to 300 feet wide, the water being quite dead, suggesting the broads of Norfolk, and forming an ideal natural canal.

In a few places it narrows down and the stream is rapid, but very small, occasionally being reduced to a width of 5 or 6 feet. In these parts it runs over gravel and boulders, which in many places have been taken out of the channel in order to enable canoes to pass in low water.

The country on either side is timbered with small spruce and poplar, the wide flat valley being bounded by low hills.

A thick growth of alder and willow lines the river-banks, making it very picturesque in places, and testifying to the richness of the soil, which is in general a sandy loam, sometimes of a dark colour, interstratified with frequent beds of clay.

July 25th. As Davis lake is approached the river becomes more crooked than ever, forming innumerable loops from side to side of the valley, which is here from four to five miles wide. In places the river spreads out into a number of sloughs, the water being so dead that it is very difficult to tell where the channel is.

At 3.15 Davis lake was reached, and traversed, a distance of six miles, by 5.15. It is from one to three miles wide, several deep bays rendering the task of finding the outlet by no means an easy one. At 5.45 p.m. camp was made on the left bank about a mile below the lake.

July 26th. Below Davis lake the river is slightly less crooked than before, but otherwise very similar. Where the side of the valley is approached in a loop, the higher ground is seen to be timbered with spruce and some fir. At 2 p.m. Keary lake was reached. This lake is

about four miles long and from one to two miles wide, gradually tapering down to a width of from 200 to 300 feet, which continues for about fifteen miles farther, after which the river narrows down to 100 feet. Camped at 6.45 p.m. on the right bank.

July 27th. In order to make McLeod Lake Post by the evening, an early start was made at 6.20 a.m. For about ten miles the river continues broad-like, with occasional narrow places and riffles. The banks are getting higher, being here from 10 to 20 feet high, still thickly grown with willow and alder. On the higher ground cottonwood, spruce, and fir are seen.

At 8.45 a.m. McLeod lake was reached and the left side followed, crossing from point to point. This lake is about sixteen miles long and from one to six miles wide. When a wind springs up it is liable to become sufficiently rough in a few minutes to swamp a canoe, so that care has to be taken in crossing the open stretches.

At 3.30 p.m. McLeod Lake Post (sometimes erroneously called Fort McLeod) was reached after a hard day's paddling. There Gus Amundsen was found camped, having been there since the 21st.

The writer was greatly impressed with the transportation possibilities of this route, which, with the expenditure of a comparatively small sum of money, would make a magnificent waterway from Summit lake to McLeod, a distance in a straight line of about fifty-five miles, but by water of over 100. By dredging certain portions, aggregating perhaps ten miles in all, and widening a few places, a lake and canal route would be formed over which large scows could be hauled by stern-wheel steamers with equal ease in either direction. By cutting canals across the narrow necks of land in some of the "loops" the distance could be greatly reduced. There appears, moreover, to be no very great difficulty in the way of making the Paek, Parsnip, and upper Peace rivers navigable throughout, thus establishing a continuous waterway for the whole length of the present canoe route from Summit lake to the Peace River canyon, a distance of some 300 miles, the greater part of which traverses what will undoubtedly before many years become a very rich farming country.

July 28th, being Sunday, was spent in overhauling supplies and baking a quantity of bread.

A canoe belonging to Mr. Gething was found at the Post, and as it was larger than the one brought from Fort George it was decided to continue the journey in it. There were no natives available in the place who would have been of any use on the trip, and the writer had cause to congratulate himself on having secured the services of Mr. Amundsen, who proved invaluable throughout.

Although McLeod is one of the worst places in the Province for mosquitoes and black flies, there were scarcely any at this time, on account of the unusually dry season. The same applied all through the northern country, the rivers all being exceptionally low on the same account.

July 29th. There was a slight frost during the night, but the potatoes and other vegetables grown at the Hudson's Bay Post were not affected.

A start was made down the Paek river at 8.50 a.m. As the details of the country seen from the river from here on have been described in W. Fleet Robertson's report on his trip through northern British Columbia and the Peace River country in the British Columbia Minister of Mines' Report for 1906, further details will be reduced to a minimum here.

Owing to the very low state of the water it was necessary for both the writer's companions to wade at several places and help the canoe over the riffles. Except at these points, it was still a case of continuous paddling all the way to the Parsnip river, which was reached at 5 p.m., camp being made a mile farther down at 6 p.m.



Coal-measures showing in Canyon of Peace River.

July 30th. The Parsnip river was, even at the low stage of the water, flowing at a rate of from four to five miles an hour in most places, so that from here on considerably better speed was made without the necessity of paddling so hard or so incessantly as before.

The valley is fifteen to twenty miles wide, there being in many places flat benches from half a mile to two miles in width about 15 or 20 feet above the level of the river, underlain by a sandy loam, with beds of clay through it at intervals.

At 5.30 p.m. camp was made below the mouth of Nation river, a distance of about forty miles having been covered.

July 31st. Farther down the current becomes slacker, the river being wider, but by assiduous paddling a distance of forty miles was made, camp being pitched on the right bank at 6.20 p.m. Wild hay was growing in great profusion at this place, with some oats through it. Mount Selwyn could be seen in the distance.

August 1st. The lower part of the Parsnip is very tortuous, at one place a neck of land a couple of hundred yards wide separating points on the river five miles apart.

The mouth of the Finlay was reached at 11 a.m. Several pre-emptions have been staked in this neighbourhood, where there is a large amount of good flat bottom land.

At midday Finlay rapids were reached, and, the water being too low to allow of the canoe being run down, it was necessary to haul it over the rocks past the two worst points. Camp was made about eight miles farther down at the foot of Mount Selwyn at 5 p.m.

August 2nd. A portion of the morning was devoted to a visit to the Mount Selwyn "mine," where some work had been done on a mass of auriferous quartzite some years ago, but without any success.

A quantity of provisions was set aside for the use of the writer's two companions on their return trip and left in a cache on the north side of the river, and a start was made about 12.30 down the river through the magnificent scenery of the Rocky mountains. These are not nearly so rugged here as in the passes farther south, the peaks having been rounded off by glacial action. A halt was made on the right bank about a mile above Parle Pas rapids at 5 p.m., and the party walked down to examine the rapids, afterwards crossing over and camping on the left bank at 6.20 p.m.

August 3rd. All the most valuable portions of the dunnage were portaged past the rapids, and the canoe lined down the left shore, where there is a good but rough channel.

A short distance below these rapids the sandstone of the Cretaceous coal formation appears, and continues intermittently all the way down to the canyon of the Peace river. The valley is from one to two miles wide, the river winding from side to side, cutting a channel through the glacial drift with which the valley is filled, one, two, and in places three terraces having been formed.

On the south side the land is mostly covered with small spruce interspersed with some cottonwood on the lower ground. The left bank is generally bare, having only scattered patches of timber, and would form good sheep-grazing land.

The mountains come to an end in the vicinity of Parle Pas rapids, and from there on to the canyon the valley lies between rounded foot-hills from 1,000 to 2,000 feet in height above the river-level.

Ottertail river, which comes in from the north about three miles below the rapids, has a fine wide valley suitable for agriculture. The stream is very dead over this stretch, numerous eddies considerably retarding progress. After a hard day's paddling the head of the canyon was reached and camp made on the left shore at 8 p.m.

August 4th (Sunday). The morning was spent in washing and overhauling the dunnage. In the afternoon a walk was taken to a point about two miles down the canyon. It was decided to leave the bulk of the dunnage at this camp while spending two or three days on the north side of the river, and, after returning here to cross the river above the canyon and spend a similar period on Gething creek, again returning to this camp; then to make a trip to Eight-mile Creek and return here once more in order to cross over the portage to Hudson Hope and do the rest of the examination from that end.

August 5th. A cache was made and the bulk of the things raised into it. The party then started eastwards along a trail cut out the previous summer by the surveyors, reaching their main camping-ground, about four miles down, at 11.45 a.m. Camp was made here, and in the afternoon the party descended into the canyon and travelled down in it for about two miles. Owing to the very low water it was possible to walk along the bottom of the canyon past many places which are usually quite inaccessible, and the writer was thus enabled to take complete sections over considerable portions of this distance, interrupted only where rock-slides or other disturbing features covered the measures.

August 6th. Starting at 7.30, the party travelled down the canyon to the point reached the previous day, and continued for about a mile and a half farther, having, however, to take to the cliff, climbing 200 or 300 feet on several occasions. An intermittent section was thus obtained.

Finally a point was reached which it was impossible to get round, and after returning a quarter of a mile an ascent was made out of the canyon and on to the hill behind, a height of 740 feet. From here the mouth of Johnson creek was seen in the distance.

August 7th. Starting at 6.45, a trip was made up the river, descending into the canyon a quarter of a mile above the camp and following it up to a point opposite the mouth of Gething creek, beyond which further progress was impossible. Returning, the bottom of the canyon was followed down to the point at which the descent had been made into it on the previous days, thus making an almost complete traverse of the canyon from the mouth of Gething creek for about five miles down-stream.

In the afternoon the party returned to the camp at the head of the canyon, meeting there a Mr. Gregory who has a number of pack-horses. From him it was learned that the Hudson's Bay Company's steamer was expected to make its last trip up to Hudson Hope about the 15th, and, as the writer was pressed for time, it was decided to abandon the intended trip to Eight-mile creek, and, after examining the Gething creek exposures, to cross over the portage on the 11th, leaving four days for the trip to Johnson creek.

August 8th. Crossing the river half a mile above the head of the canyon, the party proceeded by the somewhat circuitous trail to the North fork of Gething creek, which was struck about a mile above its confluence with the main fork. Camp was made at this point, and in the afternoon the creek was followed up for a mile, and some coal-exposures seen, but none of any great thickness.

August 9th. It rained from 3 a.m. until midday, thoroughly wetting the brush, and no examinations could be made in the morning; but in the afternoon the creek was followed down to a point about 300 yards below the forks, or half a mile from the Peace river.

For the greater part of this distance Gething creek was in canyon, progress being rendered all the more difficult on account of the frequent falls, and it was necessary on one occasion to climb to a height of 300 feet out of the canyon, descending into it some distance farther down. Beyond the point reached progress was impossible, the canyon being precipitous on both sides. A coal-seam 3 feet 8 inches in thickness (G 12) was seen at the lowest point reached.

August 10th. Returned to the camp at the canyon-head in the morning. During the afternoon the writer made a further examination of the rocks in the immediate neighbourhood.

August 11th. Crossed over the trail to Hudson Hope, a distance of about fourteen miles, the dunnage being carried by two of Mr. Gregory's pack-horses. This trail runs in an easterly direction, passing to the north of Bull's Head mountain over a neck of land 700 feet higher than the river at the upper end of the portage, and nearly 1,000 feet above it at Hudson Hope. The river makes a detour to the south of Bull's Head mountain through the canyon. In the evening the party crossed to the right bank of the river and made camp.

August 12th. It rained all night, the brush being very wet in the morning. Mr. Gregory's partner, Mr. Miller, with a pack-horse and a saddle-horse, accompanied the party. Owing to the considerable amount of muskeg on the trail the load was later on divided between the two horses.

In this neighbourhood the valley is from two to four miles wide, covered with a luxuriant growth of grass, and lightly timbered in patches with small poplar, giving it a park-like and very beautiful appearance.

Coal creek, a branch of Johnson creek, was reached at 4.30 p.m. and camp made.

August 13th. Followed Coal creek and Johnson creek down to the mouth of the latter. Although the distance was only about four miles, the time occupied was considerable, the party having to climb bluffs 250 to 350 feet high on several occasions, it being impossible to follow the creek-bed all the way. The last half-mile is in a wide, flat valley, with no rock-exposures.

The principal coal-exposures occur on these creeks, but proved to be considerably smaller than the writer had been led to expect, there being only four seams over 3 feet thick, the thickest being barely 4 feet. In the expectation of coming to a number of larger seams, the writer omitted to take a sample of one of these (J 13), which is to be regretted, as this seam proved to be of importance for purposes of correlating this section with that on Moose Bar creek.

The greater thickness attributed to the seams was no doubt due to the fact that bands of dark shale (often indistinguishable from coal except on a freshly broken surface) had been included in the estimated thickness. The measures, while exceptionally free from disturbances, are very irregular as regards the continuity of individual beds.

August 14th. Leaving camp at 7.30, the mouth of Johnson creek was reached about 11 a.m., and the shore of the Peace river followed up for about a mile and a half, to a point opposite the lowest point reached on the opposite shore from above. Returning to the mouth of Moose Bar creek, that stream was followed up for about half a mile to a fall which barred further progress. An almost complete section was obtained on this creek, corresponding in part to that obtained in the neighbouring portion of the Peace River canyon.

Returning to the mouth of Johnson creek, the Peace river was followed down for a mile. This portion of the river is wide and open, no rock-exposure being visible from the mouth of Moose Bar creek for several miles down, except a small patch of highly tilted sandstone a third of a mile below Johnson creek. Similar uptilting of the measures is seen on Grant mountain across the river, and on the hill to the east of Johnson creek. Finally camp was reached at 9.45 p.m.

The possibilities of Johnson creek for water-power development are worthy of notice, there being over 200 feet head between the forks and Peace river, the quantity of water at the forks being at this low stage of the water something like 2,000 cubic feet per minute, or about 1,300 miners' inches. Gething creek is of considerably more importance in this respect.

August 15th. Returned to Hudson Hope, camping again on the south bank of the river.

August 16th. Travelled up a creek opposite Hudson Hope for about three miles, examining the measures. No coal was seen, these measures being in the lowest portion of the coal-bearing formation (Dunvegan series). The exposures seen were, however, intermittent, and the possibility of coal occurring in this portion of the series is not excluded.

August 17th. Travelled up a trail on the north side of the canyon for six miles, then struck across and descended into the canyon at a point about five miles in a straight line from Hudson Hope, and followed the river up for a mile and a half, passing the mouth of Deep creek on the opposite side. Returning, the canyon was followed for two miles down before striking inland to the trail. In this part of the canyon the measures consist of the dark-brown, earthy, Fort St. John shales, which continue in the bottom of the canyon for some distance above the mouth of Deep creek before they disappear under the coal-measures.

August 18th, being Sunday, was devoted to rest and washing.

August 19th. The morning was devoted to a general inspection of the neighbourhood and a visit to Mr. Miller's ranch. The few ranchers who have made any serious attempt at cultivation have had great success in raising potatoes and other vegetables.

In the afternoon two Indians arrived in a canoe with the mail from Fort St. John, and as they had no news of the steamer, the writer arranged to travel down with them to that place, leaving his two companions to return up the Peace as arranged. Starting at 8 p.m., five miles were travelled that night and camp made on the left bank at 9.15 p.m.

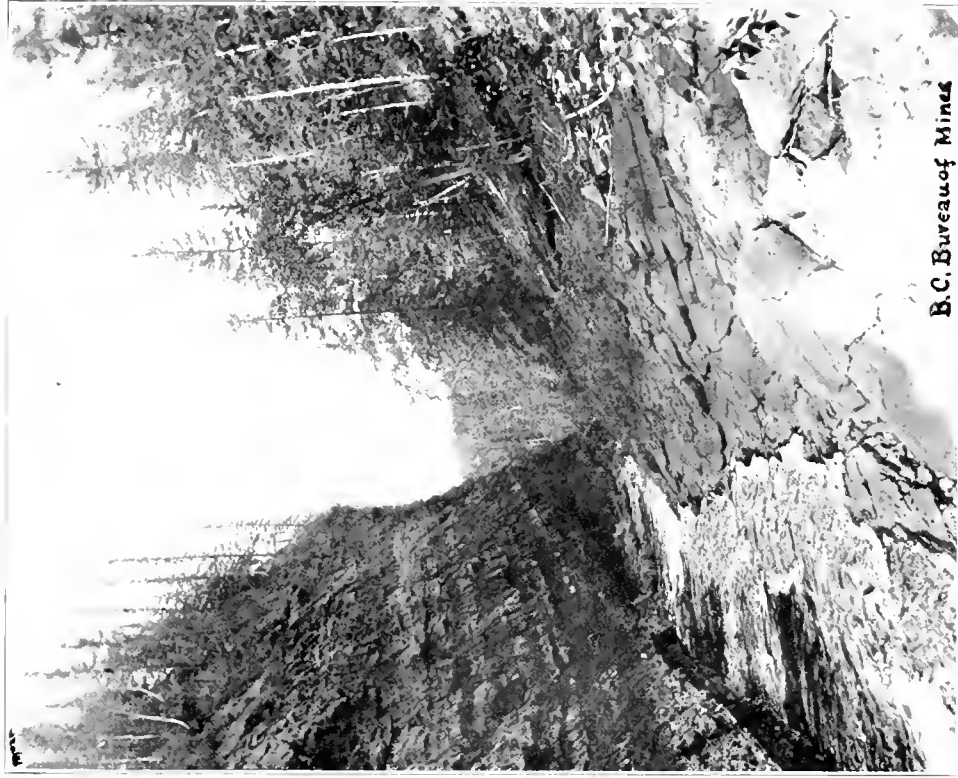
August 20th. Starting at 7 a.m., Fort St. John was reached at 5.45 p.m., the Indians doing scarcely any paddling, allowing the canoe to drift with the stream, which was running at an average rate of about four miles an hour.

August 21st to 24th. All the local Indians being out hunting and the mail-carrier not being available, the writer waited for four days in the hope of the Hudson's Bay Company's steamer turning up, it being expected daily.

One settler, J. Wood, has taken up land here, having cleared some 10 acres ready for cultivation next year. This year he has raised good crops of oats, potatoes, turnips, beets, etc., on the ground attached to the police station. Vegetables have been raised for a number of years by Mr. Beaton, the Hudson's Bay Company's factor, who even has some healthy-looking tobacco plants in his garden. Wild hay is regularly harvested on the plateau 700 feet above the level of the river.

The steamer not having appeared by the 24th, and knowing that to miss the stage at Peace River Crossing on the 29th would entail another week's delay, the writer was finally enabled, through the good offices of Mr. Godsell, manager for Revillon Frères, to secure a young Indian who was willing to accompany him as far as Dunvegan, and a canoe was purchased for \$15.

August 25th to 27th. For two days and a half the writer travelled down-stream with the Indian, Yi hea, who could not speak a word of English, and who could not be impressed with the idea that time was of any value, and that there was any sense in paddling down-stream. Finally at 1 p.m. on the 27th Dunvegan was reached. About 500 settlers are in this neighbourhood this summer, all on the plateau land, not visible from the old settlement, which is in a hollow, only 50 feet above the level of the river. From here on navigation is perfectly easy, and the writer accordingly proceeded alone at 4 p.m., camping on the left bank fifteen miles down at 7.30 p.m.



B.C. Bureau of Mines

B.C. Bureau of Mines

Peace River Confield—Measures showing on Johnson Creek.

August 28th. Starting at 7 a.m., the writer travelled down the river, reaching the beginning of the Shaftesbury Settlement at 3 p.m. The fields of ripe grain looked very promising. Peace River Crossing was reached at 8 p.m.

August 29th to 31st. The stage leaving on the 29th for Grouard was full up, but a passage was secured in another rig leaving on the same morning. Travelling with the same team all the way, progress was slow, the road being very bad for the last forty miles. Grouard was reached by both vehicles on the morning of the 31st. This is already quite a busy little settlement, on the east shore of Buffalo bay, near the western extremity of Lesser Slave lake.

September 1st. Leaving Grouard at 9 a.m. on the Northern Transportation Company's paddle-steamer, Sawridge, at the eastern end of the lake, was reached by night, the steamer tying up there.

September 2nd. Starting down Lesser Slave river in the morning, Saulter's Landing was reached at noon. From here on the river is not navigable for a distance of sixteen miles, to within a mile of its confluence with the Athabaska river. A portage was made over this distance by wagons during the afternoon.

September 3rd. Travelling on the Northern Transportation Company's stern-wheeler "Northland Echo," Athabaska Landing was reached at 1 p.m. Here it was learnt that the railway from Edmonton, which had been out of commission for the last three weeks on account of the track sinking in the muskeg (tying up all freight and accounting for the delay of the Hudson Bay Co.'s steamer on the Peace river), had been put in order and taken over from the contractors by the Canadian Northern Railway Company the day before, and that the first passenger-train had left Edmonton that morning and would return the following day. It arrived about 8 p.m.

September 4th to 9th. Travelled in to Edmonton on the first passenger-train on the 4th, and reached Vancouver on the morning of the 9th, having stayed over two days on private business on the way.

THE COAL-MEASURES OF PEACE RIVER CANYON.

REPORT OF C. F. J. GALLOWAY, B.Sc.

GEOLOGICAL AGE.

The Cretaceous rocks of the Peace river have been divided by Dr. Dawson* into four subdivisions, each well marked lithologically, as follows:—

- (1.) Upper sandstones and shales, with lignite coals (Wapiti River sandstones);
- (2.) Upper dark shales (Smoky River shales);
- (3.) Lower sandstones and shales, with lignite and true coals (Dunvegan sandstones);
- (4.) Lower dark shales (Fort St. John shales).

In the comparative table accompanying his report, he places the Fort St. John shales opposite the Benton group of Nebraska and the Rocky mountains, and the upper shales (A), of Queen Charlotte islands. The Smoky River shales he considered as undoubtedly corresponding to the Pierre group, and the productive coal-measures of Nanaimo and Comox.

The Dunvegan sandstones, which are the productive measures in this region, are thus seen to be older than those of Nanaimo and Comox, and more recent than those of Queen Charlotte islands and the Crowsnest fields.

*Can. Geol. Survey, Rep. Prog., 1879-80, p. 115r.

EXTENT AND GENERAL STRUCTURE OF THE COALFIELD.

Descending the Peace river through the Rocky mountains, measures of Palæozoic age are passed through, greatly disturbed in the process of mountain-making, several great over-thrust faults occurring.

A few miles below Parle Pas rapids, where the mountains proper end and the foot-hills commence, the sandstones and shales of the Dunvegan series come in, and, although the valley itself is almost everywhere covered with glacial and alluvial deposits, the sandstones are seen at frequent intervals in the steep faces of the hills on either side, all the way down to the canyon of the Mountain of Rocks, a distance in a straight line of about thirty miles, but over forty by river.

For about half this distance they dip to the south-west at angles of from 15 to 25 degrees. In the neighbourhood of Twenty-mile creek an anticline crosses the valley, the measures appearing horizontally for a short distance, and then dipping at small angles to the north-east almost to the head of the canyon.

At this point a chain of high hills comes in from the north-west, barring the progress of the river. These hills consist of the Palæozoic limestones, etc., tilted at a high angle to the south-west, the most prominent being Bull's Head mountain, a dome rising to a height of about 2,000 feet above the level of the surrounding country, a little to the south of the general line of the Peace river, which here makes a large detour to the south, flowing round the flank of this mountain, having cut a deep canyon in doing so.

To the south and south-west of Bull's Head mountain the coal-measures have been tilted up, showing a south-westerly dip of from 10 to 25 degrees through the upper part of the canyon.

Where the river crosses the axis of uplift, the coal-measures have undergone greater disturbance; in Grant mountain, a southerly spur from Bull's Head mountain, they are tilted at an angle of 45 to 50 degrees south-westerly. Beyond this the river is more open for some miles, the hillsides being generally densely wooded, and exposures are few.

A few miles farther west the sandstones are again seen, now dipping to the north-east at moderate angles. Continuing down the river, they gradually flatten out, showing a very slight southerly dip throughout the lower part of the canyon, to within about four miles of Hudson Hope, beyond which the sandstones disappear, and the underlying Fort St. John shales occupy the walls of the canyon and the banks of the river beyond the end of the canyon at Hudson Hope for a distance of about sixty miles.

Beyond the mouth of the North Pine river the coal-measures again come in, and continue with a slight easterly dip all the way down to Dunvegan, but no coal has yet been observed in this portion.

The extension of the measures back from the river is undoubtedly very considerable in either direction. Coal has, for many years, been known on the South Pine river, and locations have been staked for coal-prospecting licences along the whole course of that river from the boundary of the Dominion Block to the neighbourhood of the Pine River pass. Coal has been discovered on this river at least as far east as the forks.*

On the North Pine river coal is also reported outside of the Dominion Block, so that, if the measures are continuous between these points, this gives the field an extension of at least seventy-five miles north and south, without the limit being established in either direction.

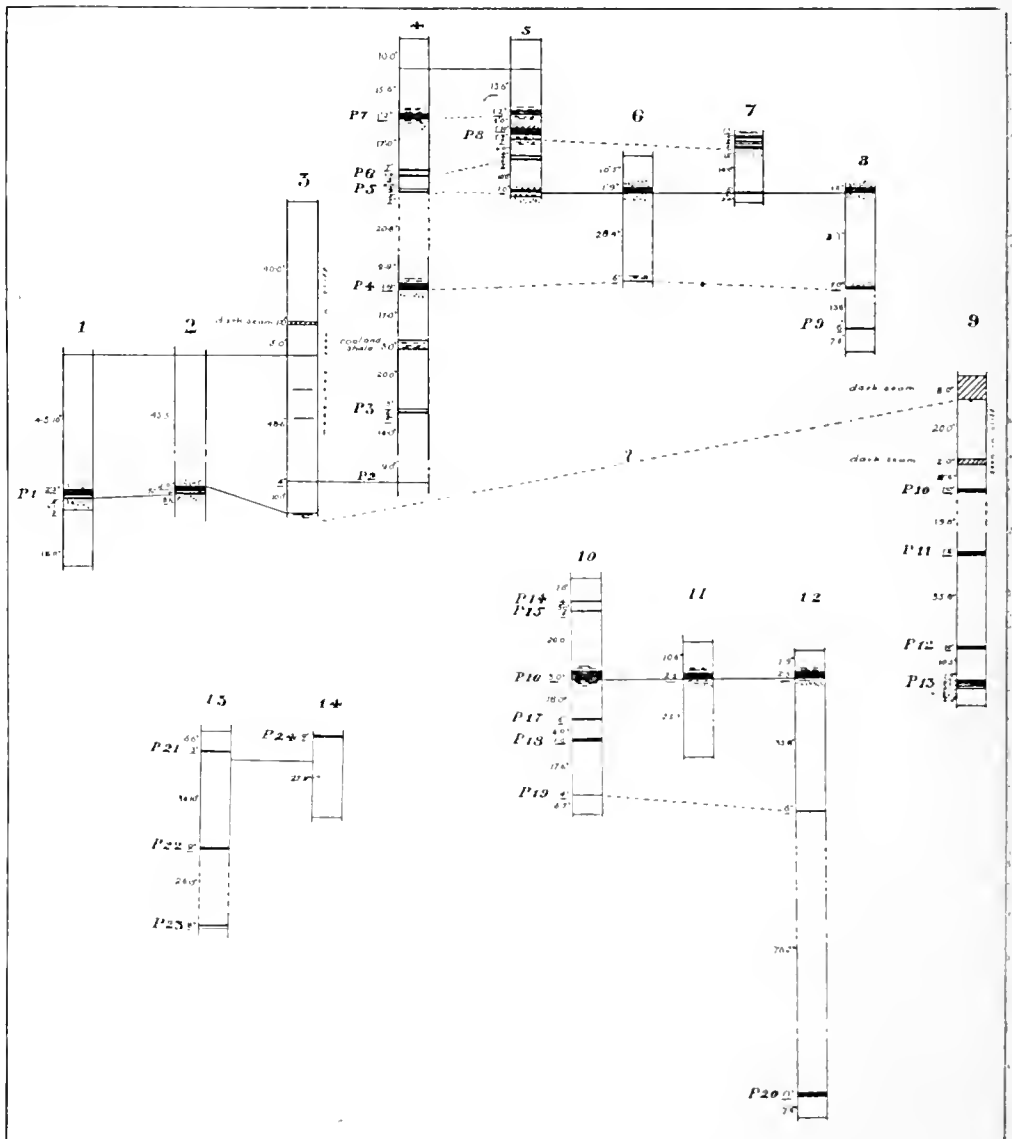
* Can. Geol. Survey, Rep. Prog., 1875-6, p. 53.

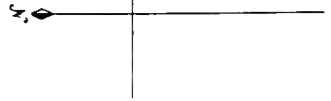
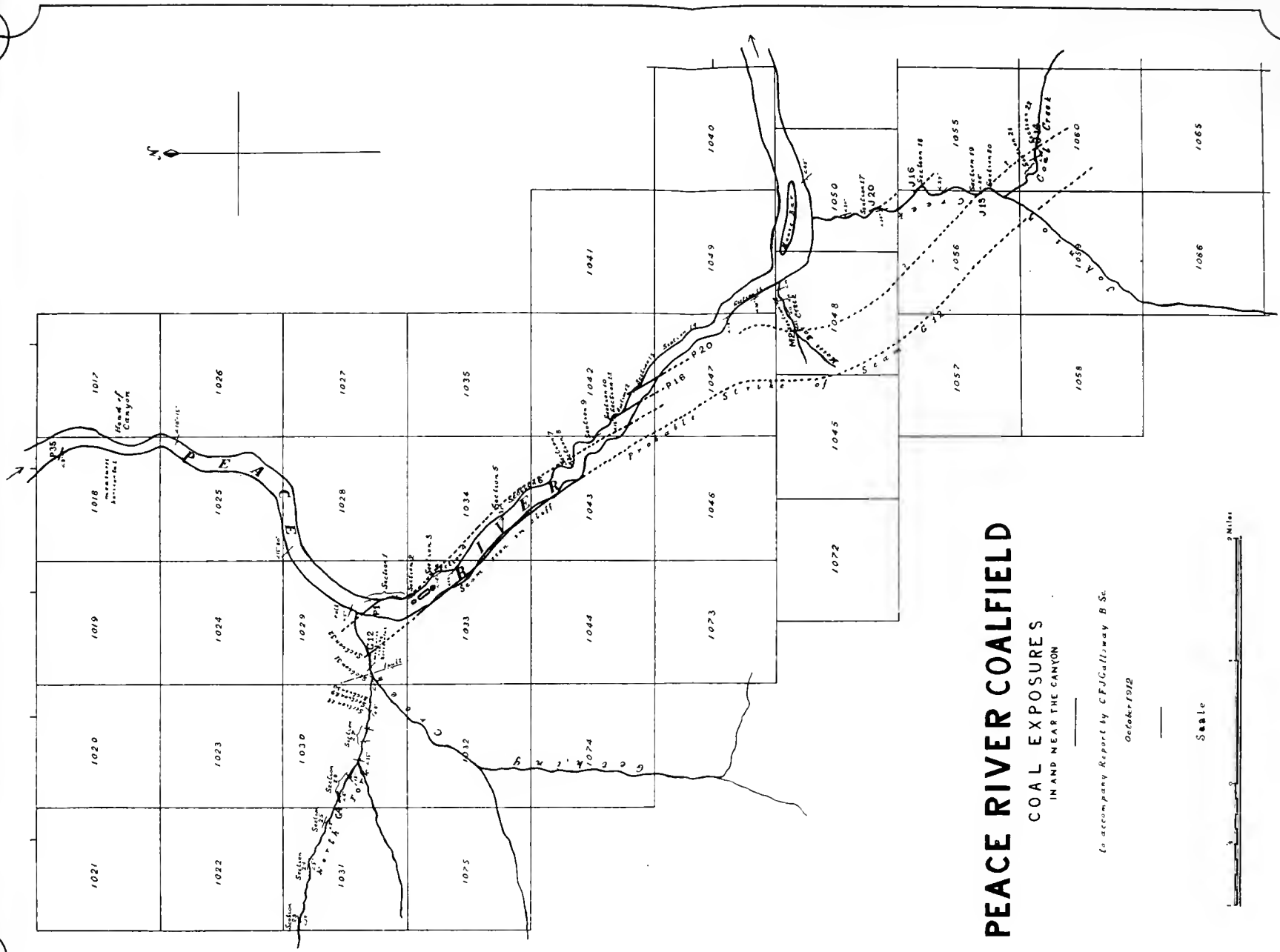
On the upper part of the Peace the coal formation extends, as has already been described, for about forty miles in an east-and-west direction, from just below Parle Pas rapids nearly as far as Hudson Hope, and, whether this portion is continuous with either of those mentioned to the north and south or not, it is reasonable to expect that it has considerable extension to the north-west and south-east.

It would obviously be impossible to form any estimate of the area actually underlain by coal-measures without exploring a very considerable amount of territory.

CHARACTER OF MEASURES.

The lowest beds seen at the head of the canyon consist of grey and brown sandstones, with beds of grey and dark, almost black, shale. One coal-seam, 1 foot 6 inches thick, was seen in this part of the series on the right bank of the river, half a mile above the head of the canyon.





PEACE RIVER COALFIELD

COAL EXPOSURES IN AND NEAR THE CANYON

to accompany Report by C.F. Galloway, B.Sc.
October 1912

Scale



In the lowest beds visible are included some irregular beds and patches of fine conglomerate, containing pebbles up to half an inch in diameter of quartz, feldspar, slate, jasper, etc. This was the only conglomerate seen in these measures, and indicates that at this point the measures of the Dunvegan series were deposited unconformably on the older measures, without the Fort St. John shales being present.

Following the canyon down towards the mouth of Gething creek, about 600 feet of measures are passed through, consisting of similar brown and grey sandstones in beds of from 10 to 50 feet thick, alternating with beds of dark-grey sandy shale from 2 to 20 feet in thickness. This portion of the canyon is for the greater part inaccessible, being in places 200 feet deep.

About a mile above the mouth of Gething creek a number of dark seams are seen in the distance, which are no doubt coal, and probably represent some of the seams seen on Johnson Creek.

The next supervening 600 to 700 feet of measures are well exposed in the south-east running portion of the canyon, and consist of coarse grey and yellow sandstone, many beds of sandy shale of all grades between true sandstone and shale, a number of beds of pure shale, and many thin seams of coal. Some of the beds of sandstone have a very strong yellow colouration from iron-oxide, and can often be traced by this over considerable distances.

Occasional massive sandstones occur, up to 20 feet in thickness, in the upper portion of these measures, but, as a rule, the sandstones are well bedded, frequently showing ripple markings and occasionally false bedding.

Traces of fossils are frequent, fragments of wood, leaves, etc., but none in sufficiently good preservation to be of use for purposes of identification.

All the coal-seams seen, with the exception of the one already referred to, occur in this portion of the measures, and include a large number of thin seams and a few thicker ones, the latter being chiefly in the lower part of this subdivision, exposed on Johnson creek.

On Gething creek, just below the forks, a fault, with a westerly down-throw, appears; the extent of its throw has not yet been determined, individual beds not having been correlated on either side. It is probable, however, that the beds on the west side of the fault are the highest seen.

The coal-seam, G 4, on the west of the fault has a certain resemblance to G 12 on the east, and if these are the same, the fault must have a throw of about 300 feet. It is possible, however, that G 12 is higher in the series, occupying perhaps a position intermediate between G 10 and G 11, in which case the throw of the fault will be 50 or 60 feet.

Continuing down the canyon towards Hudson Hope, the underlying Fort St. John shales present a totally different appearance from the coal-measures, being dark brown in colour and containing no beds of sandstone.

THICKNESS OF MEASURES.

On Grant mountain the Cretaceous rocks are seen tilted at an angle of 45 to 50 degrees for a distance of half a mile, proving a thickness of at least 1,500 feet below the coal-bearing horizon described. This, no doubt, includes a considerable portion of the Fort St. John shales as well as the lower portion of the Dunvegan series.

We have seen that at the upper end of the canyon there is a thickness of at least 600 feet of measures in the Dunvegan series below the known coal-bearing zone, which may be said to commence on the river a mile above the mouth of Gething creek.

From this point up to the seam, G 12, is a thickness of about 700 feet of coal-bearing measures. As the actual position of the higher measures exposed on Gething creek is not known, the thickness above G 12 cannot yet be determined. In the lower canyon of Gething creek, where the seam is seen, there is about 200 feet of similar measures seen above it.

On the Johnson creek section the seam, J 13, being probably identical with M 2 on Moose Bar creek, may be expected to occupy a position between P 9 and P 10 in the Peace River canyon, being thus about 420 feet below G 12.

From J 13 down to J 20 is about 280 feet, making the latter 700 feet below G 12, and therefore about the horizon of the dark bands seen in the canyon a mile above the mouth of Gething creek.

The measures for several hundred feet below this, as already described, are inaccessible in the upper part of the canyon, and not exposed in the lower, so that it is quite possible that coal-seams may occur in this portion also, the 700 feet described being only that portion in which coal-seams have been observed.

We have, then, in addition to the 700 feet of coal-bearing measures, a minimum thickness of 200 feet of similar measures above and 600 below, making a total of 1,500 feet for that portion of the Dunvegan series which can be observed. It is probable that the actual thickness of this series is at least 2,000 feet in this part of the field.

COAL-SEAMS.

On the Gething Creek section twelve seams were observed, but of these only five, G 4, G 5, G 7, G 8, and G 12, are over 2 feet in thickness, the last being the only one over 3 feet; having the following section:—

	Ft.	In.	
Sandstone roof.		7	
Shale.....		4	
Coal (dull).	1	4	Total coal, 3 ft. 8 in.
" (bright).	1	4	
Parting (shale).		1	
Coal (bright).	1	0	
Sandstone floor.			

A seam which is probably G 12 is seen in the cliff on the south side of the Peace River canyon from a point opposite the islands for a distance of nearly two miles, where it finally disappears at the top of the cliff. Several dark seams, probably of coal, one of which is of considerable thickness, are seen above it, but as that part of the canyon is inaccessible they could not be examined.

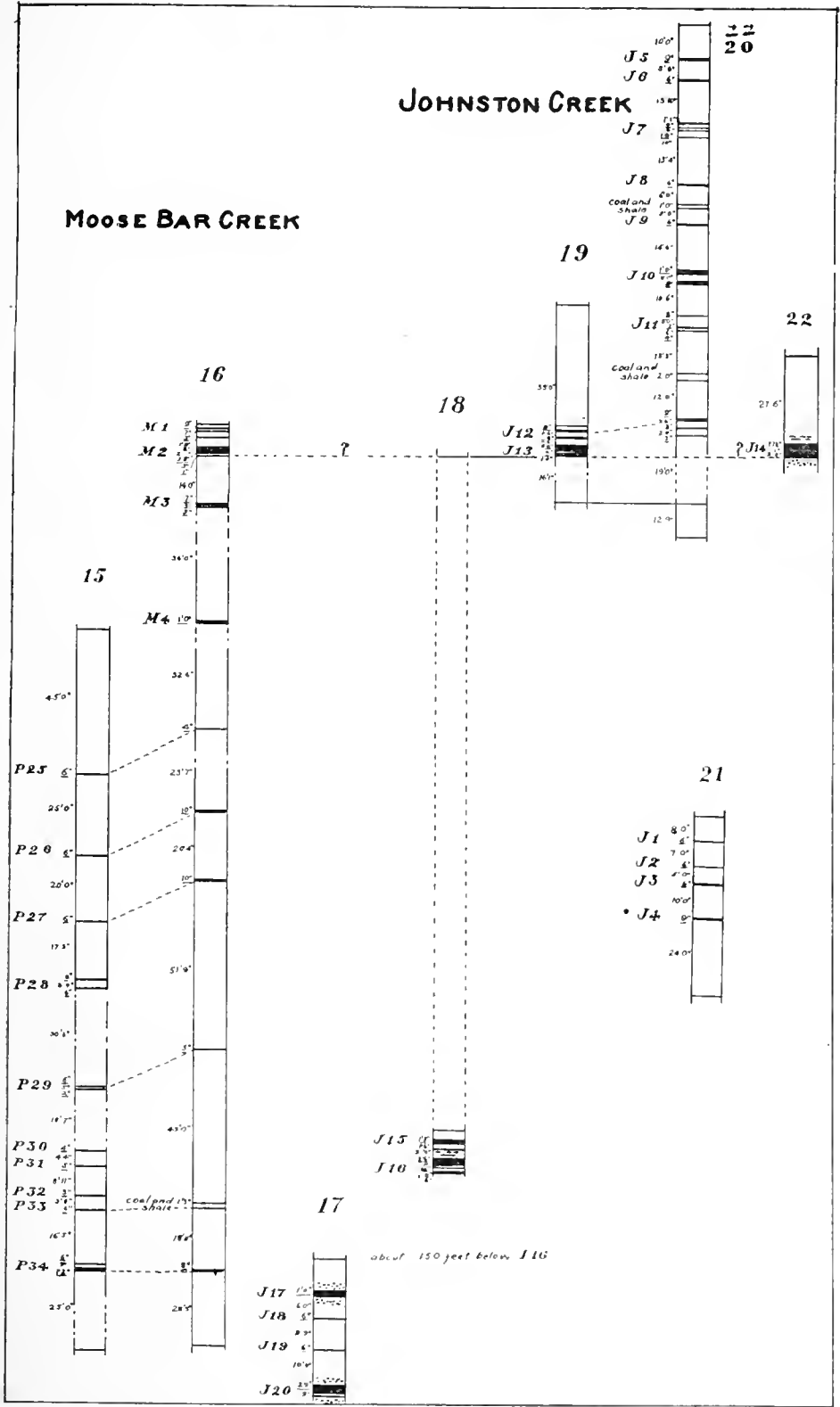
The analyses from G 12 show it to be of remarkably high quality (Samples 7 and 8), the dull coal from the top bench being the best, and having only 2.1 per cent. of ash.

This seam, although not very thick, will, on account of its good roof and floor, its freedom from admixture with shale, and particularly on account of its high quality, prove a most valuable one.

In the Peace River canyon there are numerous seams exposed, no less than thirty-four having been counted, after eliminating all which are probably repetitions of those already seen. Of these, however, the greater number are very thin, only twelve being over a foot, and three over 2 feet in thickness.

Of these, P 1 measures 2 feet 11 inches in one place, and P 16 was estimated at 3 feet in Section 10, where it was inaccessible, but measured only 2 feet 3 inches in Sections 11 and 12.

The seam P 1, which is 280 to 300 feet below G 12, is of even higher quality (Sample 6), possessing also a strong roof and floor.



In the Moose Bar Creek section a number of thin seams occur, corresponding to those seen in the lower part of the canyon section (Section 15). Above these four more seams were seen, only one of which, M 2, is of any importance. It has the following section:—

Sandstone roof.	Ft.	In.	
Shale	1	0	
Coal (dull)		9	} Rider (M 1). Total coal, 1 ft. 0 in.
Shale	7	7	
Coal (dull)		3	
Sandstone	1	7	
Coal		1	
Sandstone		3	
Coal		2	
Shale	2	7	} M 2. Total coal, 2 ft. 8½ in
Coal (bright)	1	11½	
Sandstone		½	
Coal (bright)	1	6	
Shale		3	
Coal (bright)		1	
Hard shale floor.			

The analyses from this seam (Samples 17 and 18) are not so satisfactory, but the excessive ash, particularly in Sample 18, is no doubt due to an admixture of shale in the sample. If the seam was stripped for a distance of a few feet and fresh samples taken from the clean surface, much better results would undoubtedly be obtained. In places there is a band of shale, from ¼ to 1 inch in thickness, in the middle of the lower bench of coal, and it would be hard to separate this altogether from the coal in working, so that this cannot be regarded as a very clean seam.

Passing across to the section on Johnson creek, we find twenty seams exposed, of which nine are over 1 foot, four over 2 feet, and three, J 13, J 14, and J 16, over 3 feet in thickness.

Of these latter, however, it is just possible that J 13 and J 14 may be identical, both corresponding to M 2. The sections of J 13 and M 2 are very similar, each having a small rider of dull coal above it, and the correspondence of these two is highly probable. In the case of J 14, however, the similarity is much less, and its analysis would almost exclude the possibility of its being correlated with M 2. Unfortunately no samples were taken of J 13.

The sections of the principal seams seen on Johnson creek are as follow:—

J 12 and J 13.

Shaly sandstone.	Ft.	In.	
Shale	1	0	
Coal (dull)		10	} Rider (J 12). Total coal, 1 ft. 4 in.
Shale	1	0	
Sandstone		2	
Coal (dull)		6	
Shale	2	6	
Coal (bright)	2	0	} J 13. Total coal, 3 ft. 3 in.
Shale		2	
Coal (bright)	1	3	
Sandstone		1	
Shale floor.			

J 14.

	Ft.	In.	
Sandstone.			
Grey shale	1	6	
Hard shale		2	
White sandstone		4	
Hard grey shale	1	6	
Coal	1	8	} Total coal, 3 ft. 11 in.
Sandstone	0 to 2		
Coal	2	3	
Sandstone floor.			

J 15 and J 16.

	Ft.	In.	
Sandstone.			
Coal	1	3	Rider (J 15).
Sandstone	1	6	
Shale	3	0	
Coal (hard)	2	6	} J 16. Total coal, 3 ft. 4 in.
Shale		1	
Coal		2	
Shale	1	0	
Coal		8	
Shaly sandstone floor.			

J 20.

	Ft.	In.	
Sandstone roof.			
Coal	2	3	} Total coal, 2 ft. 9 in.
Coal		6	
Shale	4 in. to 1	0	
Sandstone floor.			

In cases where a seam is visible over a considerable distance, the thicknesses of the individual benches of coal and shale is very variable, the shale sandstone partings in the seams being frequently of a lenticular nature, increasing within a distance of a few feet from 1 inch to over 1 foot in thickness, and diminishing again as rapidly. The sections given represent, as nearly as could be observed, average conditions.

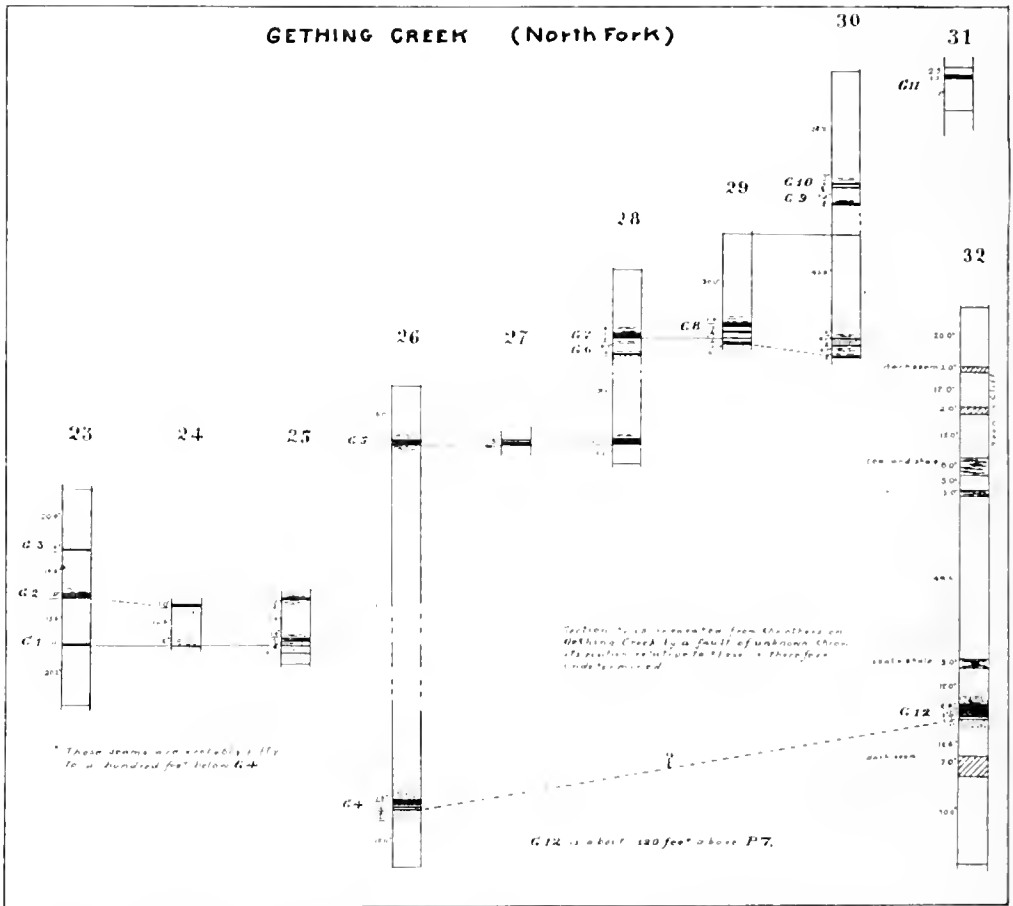
The analyses of these seams (Samples 10 to 14) show considerable variation in quality; J 14 shows a higher proportion of volatile matter than any of the other seams except G 1 (Sample 9). Only the lower bench of J 14, however, shows any coking qualities. The lower bench of J 16 is also described as coking fairly well.

Several of the samples from the Johnson Creek seams show fairly high ash, although not by any means excessive in comparison with other coals worked in this country. It is, moreover, to be expected that clean samples, taken from a fresh face, free from surface impurities, will show better results in this respect.

From the foregoing it appears that among the multitude of seams exposed there are only five outcrops yet known in which the thickness is greater than 3 feet, viz., G 12, M 2, J 13, J 14, and J 15, and of these it is probable that M 2 and J 13 are the same.

The canyons of the Peace and its tributary creeks afford unequalled opportunities for examining the measures, but, in spite of this, it is obvious that the amount of strata within the known coal-bearing zone which have not yet been examined, owing to their being nowhere exposed, or only in inaccessible places, is very great, and there is every reason to believe that many more seams exist besides those described, among which there may well be a number of larger ones.

Coal-outcrops are also reported on Eight-mile creek, seven or eight miles from its mouth. These are probably the same measures as those seen in the canyon.



There are, it is true, other fields in the West in which coal of all grades from bituminous to anthracite occur, but as a rule the high quality of these coals is due to local disturbances, and are generally in very disturbed regions, and frequently exceedingly dirty.

In this field, on the other hand, the regularity of the measures and their freedom from disturbance is remarkable, and the low ash-content in most of the samples, taken as they all were from outcrops, shows the exceptionally clean nature of these seams.

Only three of the samples showed any coking quality, and these only fair, so that great expectations are not to be based upon the prospects of this field for coke-making purposes, although it is by no means impossible that fair-sized seams will be found which will yield a good coke, especially in retort ovens.

The top benches of the seams P 13 and G 12, and the riders (probably identical) M 1 and J 12, consist of coal of a peculiar dull, stony appearance, resembling carbonaceous shale. The analyses show this to be coal of a very good quality, that in the upper bench of G 12 (Sample 7) only having 2.1 per cent. of ash.

TRANSPORTATION.

The canyon forms an impassable barrier to navigation on the Peace river, there being a fall of 250 feet in a distance of rather more than twenty miles. There are no large falls, but an almost continuous succession of rapids. In places, as at Moose Bar, the stream is wide and smooth for some distance, but the rapids above and below render any idea of navigation impossible.

On the lower part of the river no vessel can travel for more than a very short distance above Hudson Hope. In order to ship the coal by river, it will therefore be necessary to construct a railway or tramway to a point in that neighbourhood, a distance of about twelve miles from the coal-exposures on Johnson creek.

Scows can be taken down the river as far as Vermilion Falls, a distance of over 600 miles. The coal can therefore be distributed throughout the Peace River country very cheaply.

Several railways are now heading for this country, and within the next few years there will be a number of points on the Peace river in direct railway communication with the outside. There will no doubt before long be a line in the immediate neighbourhood of the canyon, possibly crossing the river in the vicinity of the mouth of Johnson creek, so that, remote as this field now is from the outside world, it will be so for very little longer.

MARKET.

The principal market for this coal will undoubtedly be on the Prairies. The rich Peace River district itself, now almost uninhabited, will, with the advent of the various railways now under construction or being surveyed, develop very rapidly. Timber is not very plentiful, large portions consisting of prairie land, and there will therefore be a considerable market for coal in that country itself.

The high quality of the coal will enable it to compete far afield for railway consumption, to say nothing of the steam navigation on the Peace, Athabaska, and other great rivers and lakes of the Mackenzie basin.

APPENDIX.

ANALYSES OF PEACE RIVER COALS.

By H. CARMICHAEL, BRITISH COLUMBIA GOVERNMENT ANALYST.

Sample No.	Scam.	Thickness.		Hygro. Water.	Vol. Comb. Mat.	Fixed Carbon.	Ash.	Sulphur.	Coking Quality.	Split Vol. Ratio.	Cal. Value B.T.U.
		Ft.	In.								
1	P 8, top bench.....	1	10	2.0	20.2	72.2	5.6	.....	None	6.80	.....
2	P 8, bottom bench..	0	7	1.7	17.7	78.9	1.7	.....	"	8.31	.....
3	P 5 (Section 6).....	1	9	2.0	19.7	75.7	2.6	.....	"	7.22	.....
4	P 13, top bench (dull coal).....	1	0	2.9	16.9	71.4	8.8	.....	"	7.03	.....
5	P 16 (Section 11)...	2	3	3.0	16.6	78.0	2.4	.....	"	7.63	.....
6	P 1 (Section 1).....	2	11	2.2	15.6	80.6	1.6	.....	"	8.84	.....
7	G 12, top bench (dull coal).....	1	4	2.9	15.6	79.4	2.1	.....	"	8.15	.....
8	G 12, lower benches.	2	2	2.8	16.9	77.2	3.1	.....	"	7.61	.....
9	G 1 (Section 25)....	2	0	5.3	19.1	69.0	6.6	.....	"	5.29	.....
10	J 14, top bench....	1	8	2.7	20.9	67.6	8.8	.....	"	5.93	.....
11	J 14, bottom bench.	2	3	1.8	23.9	67.8	6.5	.....	Fair	5.80	.....
12	J 16, top bench....	2	8	1.6	15.9	77.4	5.1	.....	None	8.93	.....
13	J 16, bottom bench.	0	8	1.0	21.4	73.7	3.9	.....	Fair	7.21	.....
14	J 20.....	2	9	1.1	16.0	73.1	9.8	.....	None	8.91	.....
15	P 34.....	1	8	1.3	18.6	77.4	2.7	.....	Fair	8.18	.....
16	M 1 (dull coal)....	0	10	1.0	14.5	70.6	13.0	.....	None	9.43	.....
17	M 2, top bench....	1	1½	3.0	18.0	73.6	5.4	.....	"	6.88	.....
18	M 2, lower benches.	1	7	1.7	16.3	53.7	28.3	.....	"	6.28	.....



Peace River Coalfield—Seam J. 16—Johnson Creek.



Peace River Coalfield—Seam J. 14—Johnson Creek.

SOUTH-EAST KOOTENAY DISTRICT.

FORT STEELE MINING DIVISION.

REPORT BY A. C. NELSON, GOLD COMMISSIONER.

I have the honour to submit a report on the progress of mining in the Fort Steele Mining Division for the year 1912.

The following table shows approximately the number of mineral claims held during each year since 1899 :—

Year.	Held under Crown Grant or Certi- ficate of Improve- ment.	Certificate of Work.	New Locations.
1899.....	37	718	729
1900.....	71	704	470
1901.....	104	642	455
1902.....	117	451	253
1903.....	142	335	200
1904.....	167	260	169
1905.....	189	193	181
1906.....	241	235	160
1907.....	254	160	115
1908.....	264	150	100
1909.....	280	154	116
1910.....	294	161	179
1911.....	307	167	96
1912.....	316	143	145

The *North Star* group, on Mark creek, has remained shut down since 1910, and it is probable that it will not be opened up again until some economic method of reducing low-grade refractory ores has been successfully demonstrated ; this also applies to the *Stemwinder* group, an adjoining property.

The *Sullivan* group, on the east side of Mark creek, has been worked steadily during the year and has shipped over 30,000 tons, besides initiating new development-work and the installation of water-power from Mark creek.

The *St. Eugene* group, on east side of Moyie lake, has still a force of some thirty men, shipping a few car-loads of ore and prospecting generally.

The owners of the *Aurora* group, after considerable prospecting during 1912, have been unable to locate any large body of ore and have closed down temporarily, but will probably open up again.

The *Society Girl* group, on east side of Moyie lake, has been steadily going ahead, shipping a small quantity of ore, but not yet in the list of regular shippers.

Some little interest in mining has appeared, particularly with regard to the Perry Creek and St. Mary districts. The former with its free-gold quartz may create some little development, as the whole of the creek above "Old Town" is located.

St. Mary district with its copper and galena would interest capital but for its transportation disabilities. Even a wagon-road would help to develop this section, for, although a certain amount of development is being done on various properties, systematic work cannot be attempted with advantage until the pack-trail is superseded.

OFFICE STATISTICS—FORT STEELE MINING DIVISION.

Mineral claims recorded.....	145
Placer claims recorded or re-recorded.....	2
Certificates of work.....	143
Certificates of improvements issued.....	10
Conveyances and other documents of title.....	23
Partnership agreements.....	1
Gold Commissioner's permits.....	3
Documents filed.....	9
Affidavits filed.....	237
Records of water grants and permits.....	...
Mining leases issued.....	3
Mining leases in force.....	37
Free miners' certificates (ordinary).....	224
" " (company).....	3
" " (special).....	3
Crown grants issued.....	9

Revenue.

Free miners' certificates.....	§1,255 50
Mining receipts.....	1,389 00

NORTH-EAST KOOTENAY DISTRICT.

GOLDEN MINING DIVISION.

H. C. RAYSON, GOLD COMMISSIONER. (OFFICE AT GOLDEN.)

NOTES BY PROVINCIAL MINERALOGIST.

No report has been received this year from the Gold Commissioner of this Division, probably due to the fact that there was a change of officials during the latter part of the year.

The Canadian Pacific Railway has been actively engaged during the year in building a branch railway south from Golden, up the valley of the Columbia river, to connect, eventually, with the line now being built northward from the Crownsnest branch of the same railway, starting near Fort Steele.

When this shall be completed, it will afford transportation facilities, now lacking, and enable the mining properties in the southern end of this Division and in the Windermere Division to do effective work; some of these properties are very promising.

There is only one producing mine in the Division, the *Monarch*, which is situated near Field, on the main line of the Canadian Pacific Railway.

The following description of this property appeared in the Chicago *Mining World*, and was written by Newton W. Emmens, a mining engineer of Vancouver:—

“The *Monarch* is one of the oldest mines in British Columbia, having been discovered in 1885, since which time it has changed hands several times. Owing to the lack of proper milling facilities it was never successfully operated until the present owners, the Mt. Stephen Mining Syndicate, acquired it and by whom it is now being operated at a profit.

“The formation in which the ore occurs is a band of bluish limestone in the Cathedral formation, which has been classified as belonging to the middle Cambrian geologic era. This rock is fissured vertically in a number of places, and it is along one of these that the ore-body, now being worked, occurs. The limestone on either side of this fissure is brecciated, the fragments being cemented together and sometimes replaced with calcite, argentiferous galena, and sphalerite. This ore-bearing limestone varies from 15 to 30 feet in thickness, and in addition to the low-grade ore, which has to be concentrated, contains bunches and masses of solid ore, often containing a large tonnage, assaying 5 oz. silver, 67 per cent. lead, and 10 per cent. zinc. No exploration-work has been done in the limestone immediately overlying the ore-bearing stratum, but as it is of a similar nature and is cut by the same series of fissures, it is probable that ore would be discovered if systematically prospected with a diamond-drill, which would be the cheapest and most expeditious method in that formation.

“In order to facilitate the mining of the ore and render the workings safe of access at all times of the year, the present owners abandoned the old trail across the talus slope and drove an adit into the mountain (near its base, and where it would be protected by standing timber), 212 feet vertically above, and 1,000 feet distant from the mill, which is situated alongside the Canadian Pacific railroad-track. This adit was driven into the mountain for a distance of

310 feet, where a raise, at an angle of 65 degrees, 475 feet long, was made coming out at the top of a cliff; from here another adit was driven 210 feet into the mountain, and from the end of it a raise was made at an angle of 55 degrees, 190 feet long, connecting with the main workings of the mine. These raises and adits are being used as routes of transportation for the ore from the mine to the mill.

"At the portal of the lower adit is located the upper terminal of a 2-bucket Riblet aerial tram, capable of handling 200 tons a day, the lower terminal being at the mill.

"The concentrating plant is housed in a building 140 x 40 feet, situated on a flat at the base of the mountain and close to the main line of the Canadian Pacific railroad, from which a spur track 350 feet long has been built. The engine and boiler room is an extension, 20 x 50 feet, to the main mill building.

"The milling plant consists of an 8 x 12 Blake crusher, a set of 24 x 10 roughing-rolls, two trommels, one 4-compartment and two 3-compartment Hartz jigs, three No. 2 Deister concentrators, one No. 3 Deister slime-table, and two Wilfley concentrators, one dewatering and settling box, two hydraulic classifiers, and two elevators.

"Power is furnished for a good portion of the year by a 4-foot Pelton wheel operating under a head of 280 feet, which generates 140 horse-power. The water is taken from Thompson creek, a stream flowing between Cathedral mountain and Mount Stephen, and is carried in a 12-inch wood-stave pipe-line 1,706 feet long to the wheel in the mill. In the winter, when the water in this creek is low, power is supplied by a 100-horse-power boiler driving a 13 x 18 slide-valve engine under a steam-pressure of 125 lb.

"Compressed air for operating the drills in the mine is supplied by two belt-driven single-stage compressors, one having an air-cylinder 12 x 12, and the other one of 14 x 15 inches, having a combined capacity of 560 cubic feet of free air a minute.

"Light for the main workings, the mill and camp buildings, is supplied by a belt-driven 10-kw. 110-volt D.C. generator.

"The mill was completed and operations commenced in May, 1912, and up to December 31st of that year had treated 20,000 tons of ore, from which was produced 1,854 tons of lead-concentrates and 185 tons of zinc-concentrates.

"Of the lead-concentrates, 1,144 tons was shipped to the smelter at Trail, and the balance of 710 tons to the smelter at Kingston, Ontario. The gross metallic contents of these concentrates was 7,808 oz. silver and 2,521,576 lb. of lead, which, after taking off smelter deductions for furnace losses, gave a net yield of 7,406 oz. silver and 2,249,236 lb. of lead.

"The zinc-concentrates were shipped to the zinc-smelters at Bartlettsville, Okla., U.S. (there being, as yet, no zinc-smelting plant in Canada), and yielded 142,643 lb. of metallic zinc.

"The exact figures as to the cost of mining, tramming, and milling have not yet been worked out, but it will be under \$2 per ton of crude ore treated. In this cost is included all development and administration charges.

"Some improvements are now being made in the mill, a Huntington mill is being installed for regrinding the middlings, and additional jigs and concentrators are being added, by the aid of which not only will the capacity of the plant be materially increased, but a cleaner product and higher percentage of saving made, more especially in connection with the zinc-concentrates, which have hitherto been somewhat high in lead and lime tenure."

WINDERMERE MINING DIVISION.

REPORT OF GEO. F. STALKER, MINING RECORDER.

I have the honour to submit the annual report on mining operations in the Windermere Mining Division for the year ending December 31st, 1912.

The mining operations in this district show very little increase over the past year in so far as development-work is concerned, which was limited, as in the year 1911, to a few properties, and, with four or five exceptions, amounted only to the necessary assessment-work.

Greater attention was paid to this district during the year 1912 by prospectors and mining-men generally than has been the case for some years. The increase in the locations of new properties and the interest taken in the older ones goes to prove that, with the completion of the Kootenay Central Railway, which is now not far distant, many of the developed properties will resume work and commence shipping ore ; also a great number of other properties will be developed and placed on the shipping list.

OFFICE STATISTICS—WINDERMERE MINING DIVISION.

Free miners' certificates issued	60
Locations recorded	75
Certificates of work recorded	28
Bills of sale recorded	11
Revenue	\$4,154.35

NORTH-WEST KOOTENAY DISTRICT.

REPORT OF ROBERT GORDON, GOLD COMMISSIONER.

I have the honour to submit herewith the annual report on the progress of mining within the Revelstoke and Lardeau Mining Divisions for the year ending December 31st, 1912.

Mining conditions have not improved any during the past year, the entire district being at a standstill.

In the Incomappleux River country the town of Camborne is almost deserted, and very little interest seems to be taken in this once prosperous camp. Lack of transportation facilities is assigned as the cause of the present depression, as a number of the properties have been shown to give values indicating the possibility of working on a paying basis, even with the present unsatisfactory facilities. There is, however, no capital in the camp with which to develop the mines, and the inducements are not great enough to bring any outside capital to this particular part of the country.

Assessment-work is being kept up by the holders of a number of properties, and the claims will no doubt prove their values in due time.

In the Big Bend section conditions have been in the same unsatisfactory state. Absolutely nothing has been done by the holders of the placer leases, the same cause being here assigned—namely, lack of transportation facilities and excessive cost of getting in a plant.

Some of these properties have, however, recently been restaked, and with an infusion of new blood into the industry it is hoped that the placer-mining industry will revive.

REVELSTOKE MINING DIVISION.

REPORT OF W. E. McLAUCHLIN, MINING RECORDER.

I have the honour to submit my annual report of mining operations in the Revelstoke Mining Division for the year ending December 31st, 1912.

The past season has been quiet in the Revelstoke Mining Division, and but little more than assessment-work has been done on the various properties. The great requisite of this Division is transportation facilities in order to render productive mining possible.

OFFICE STATISTICS—REVELSTOKE MINING DIVISION.

Free miners' certificates issued	124
Claims recorded (mineral)	16
" (placer)	3
Assessment-work done (mineral)	19
Payments instead of work	3
Agreements and powers of attorney	32

NOTES ON BIG BEND DISTRICT.

BY J. A. WATSON.

In accordance with instructions received through the Deputy Minister of Mines, I left Victoria on the night of September 11th, and reached Revelstoke at 1.30 a.m. on the morning of the 13th. Being aware before leaving Victoria that the steamer going up the Columbia on Friday, the 13th, would probably be the last of the season, owing to the low water in the river, I went at once on board the steamer, which started at daylight, and the journey of forty-five miles north to Downie creek, the present end of steamboat connection, was made by 3 p.m.; a record time of thirty-nine hours from Victoria. The weather conditions being good, and as the country to be covered was fairly extensive and the season late, I deemed it expedient to examine first the country forming the northern boundary of this mining district. Accordingly, securing a couple of horses at Downie creek and the services of one man, progress was quickly made to Mica creek. A cursory examination of the country lying along the summit which divides the headwaters and basins of Mica and Yellow creeks, both feeding into the Columbia river, revealed a continuous area of schistose formation lying at an angle of 25 degrees. Cutting this formation there occur several quartz-dykes. In these dykes the present development showed a certain amount of mica which appeared to be of a merchantable quality, samples of which I brought down, and the deposit seemed to offer sufficient inducement for further development. Mica creek proper is not at right angles to the Columbia river, as shown on the map, but at quite an acute angle, heading in the south-east and flowing north-west.

This country is practically above the balsam-timber line and offers every facility for being prospected, being open, with many rock-exposures. Leaving this portion of the country and journeying southward, a hurried visit was paid to the old gold diggings on Smith creek, French creek, and McCulloch creek. These camps were visited by Mr. Carmichael in 1905, since when very little actual work has been done.

The records show that in the early days of placer-gold mining in this section, considerable amounts of gold were obtained on several of these creeks by the miners, working as they did under the heavy disadvantages of the absolute lack of all railway accommodation and having to bring all supplies up the Columbia river from Marcus, in the State of Washington. Under such conditions only the richer ground could be worked, the season being short and supplies very costly.

The ingenuity displayed by these pioneers in the construction of plants, some of which still exist, is an object-lesson as to what may be accomplished with scanty appliances. Under such conditions, it is scarcely to be supposed that all the profitable workings were exhausted, and subsequent work, at a much later date, has shown that there are still placer deposits here which offer fair inducements to development under the improved conditions now existing.

Work to-day will have to be done on a larger scale and with improved machinery, before the installation of which the ground requires very careful prospecting, with an actual determination of the values to be found on bed-rock.

Such work is under way, although not in a very energetic manner at the present time, and, from indications, it would seem not improbable that the near future may see the installation of a series of plants having a fair chance of making a successful issue.

The lack of cheap transportation facilities north of the Canadian Pacific Railway at Revelstoke, while a serious handicap to placer-mining, is absolutely prohibitive of all lode-mining. The contact of the lime and schist belts seems to offer a very good chance for mineral deposition. That some such deposits exist has been indicated by Mr. Carmichael in the Report of 1905, but it would appear that very little change or betterment has taken place since that date, either in developing the existing properties or in the discovery of additional showings of promise. There is an abundance of surface outcroppings showing good mineral and much float ore of good grade, but development seems to await the arrival of cheaper methods of transportation, and whether this will ever be accorded without some serious development being done to show its justification is a matter of doubt.

The district is worth prospecting and is worthy of development, but the preliminary steps must be accomplished by local energy and money before outside capital can rationally be risked to do the more extensive and expensive developments necessary to make a mine.

Mr. Carmichael described the principal properties in the district in the report mentioned, and the conditions have changed little since then; but the following brief notes on a few of the properties as found this past season may be of interest:—

Standard Group. The *Standard* group has had some additional work done at the lowest workings, where the tunnel has been continued some 60 feet at a deviation to the left of approximately 25 degrees; an active continuation of this would appear to be well judged, or, as an alternative plan, the mineralization belt might be reached from the other side of the mountain.

Keystone. The *Keystone* property is one upon which the work done, as yet insufficiently demonstrative, is worthy of continuance. The *Keystone* group is located in one of the basins in which the *Keystone* creek rises and flows into the Columbia river a few miles south of the mouth of *Downie* creek. The lime zone, freely mineralized, has on this property been penetrated by two tunnels, the upper running through the belt in a distance of 40 feet, though not following the dip, the lower showing doing the same. A shaft on a slight incline was then sunk some distance and abandoned, as the ventilation was faulty; the lower tunnel was driven in about 90 feet.

One or two other properties in the neighbourhood were not reached owing to the lateness of the season and a prevalence of snow-storms.

The zones or belts met with are wide and continuous on the surface, with some mineral, but there is not sufficient work done as yet to know whether at depth satisfactory values exist.

Carnes creek was then visited, and the claims mentioned by Mr. Carmichael in his 1905 Report seen, so that any further development might be observed and noted. The work done since that time amounts to—

On the *J. and L.* about 50 feet more drifting, with the vein and both foot and hanging wall satisfactory.

On the *Annie M.* the incline shaft has been carried down another 75 feet, and the vein is 14 inches wide where work stopped.

On the claim *98* a tunnel has been run in 90 feet, also a drift made to the right of 50 feet. An incline shaft has also been sunk for 120 feet, which cuts the vein diagonally, the latter being 30 inches wide at the foot of the shaft. The strength and continuation of this vein, and the regularity of both walls, appear encouraging; the work was well and substantially done.



Buckley Lake—on Telegraph Creek—Hazleton Trail.



Dense Lake—looking North from Head of Lake.

 LARDEAU MINING DIVISION.

REPORT OF B. E. DREW, MINING RECORDER.

I beg to submit herewith a short report on the mining situation in the Lardeau Mining Division for the year 1912.

I regret to say that there has been a falling-off in most of the items of office revenue as compared with 1911.

The various properties which in the past have either shipped or milled ore have been idle the whole year.

Towards the end of the season—in fact, after the snow had appeared—several of the well-known properties were visited and examined by a well-known geologist who does not wish his name published. He appeared so well pleased with the showings on four groups of claims that he agreed to take them under bond, and to commence development-work on June 1st next. It is hoped that the result of these operations will establish that our leads, like those in the Slocan, are permanent at depth, which would do much to re-establish the confidence once reposed in this Division.

OFFICE STATISTICS—LARDEAU MINING DIVISION.

Free miners' certificates issued	42
Certificates of work	42
Payments in lieu of work	1
Locations recorded	13
Agreements and transfers recorded	4

SLOCAN DISTRICT.

AINSWORTH, SLOCAN, SLOCAN CITY, AND TROUT LAKE MINING DIVISIONS.

REPORT BY E. E. CHIPMAN, GOLD COMMISSIONER.

I beg to submit the annual report for the Ainsworth, Slocan, Slocan City, and Trout Lake Mining Divisions for the year 1912.

The mines working in the above-named Mining Divisions have fully met the expectation of the preceding year, and the feeling in all the parts of the Slocan District is of the most optimistic nature. The construction of the Canadian Pacific Railway has been completed from Three Forks to Bear lake, and the *Lucky Jim* and *Rambler-Cariboo* mines have now no difficulty in transporting their ores from the mines to their respective reducing-points. The old Kaslo & Slocan Railway has been standardized from Bear lake to Whitewater, and preparations are now being made early in the spring to standardize the old road from Whitewater to Kootenay lake at Kaslo, a distance of seventeen miles. The completion of this link will connect the Crowsnest route of the Canadian Pacific Railway via Kootenay lake to Nakusp, on the main line via Arrowhead to the Coast. When this connection is completed, all the mines on the old Kaslo & Slocan Railway will have better facilities for the shipment of their ores than ever before, and mines on the South fork of Kaslo creek, which have been practically shut off from railroad transportation since the disastrous forest fires of 1910 wiped the usefulness of the Kaslo & Slocan from existence, will now be enabled to resume operation.

AINSWORTH MINING DIVISION.

The most marked improvement in this Division was at the old Ainsworth mining camp. Many of the old properties in the vicinity of Ainsworth have been acquired by the Consolidated Mining Company of Canada, and the mines under this management have been steady shippers the past season.

At the *No. 1* mine an average of forty-five men has been employed, twenty of whom were surfacemen. About 600 tons of silver-ore has been mined; two miles of tramway has been built; new bunk and boarding houses have been erected and a boiler plant put in; 1,000 feet of development, consisting of shafts, drifts, and raises, has been made.

At the *Highland* mine the average number of men employed was thirty-eight, of whom ten were surfacemen. In development, 600 feet of drifts was run, and a 5-drill compressor plant was installed on Cedar creek.

At the *Maestro* mine six men were employed on development; 200 feet of drifting was done, and a shaft was sunk a depth of 90 feet. On the *Tiger* two men were employed during the season stripping and exposing the ledge. In addition to this work, the Consolidated Mining and Smelting Company has performed the annual assessment-work on a number of its other acquired mineral claims.

The Silver Hoard Mining Company of Spokane has employed ten men continually on the *Dellie*; has completed 400 feet of drifting and sunk a shaft to the depth of 100 feet; a new bunk-house, shaft-houses, assay office, and two dwelling-houses were built; a horse-whim and gasoline sawmill were installed; a mile of wagon-road was constructed to connect with the *No. 1* road; and 250 tons of high-grade silver-ore was shipped.

The Crown Mining Company of Spokane employed an average of three men since early in the spring of 1912 on the *Crown* mine; accomplished 150 feet of development-work, and built a new and commodious bunk-house. The *Crown* group consists of four claims upon which the annual assessment-work has been performed.

The Florence Mining Company of Spokane employed an average of ten men on development-work; sunk a shaft to the depth of 80 feet; did 200 feet of drifting and shipped about 60 tons of ore; built a new shaft-house, cook-house, several dwelling-houses, and two miles of road to connect with the Government road on the lake-shore.

A. D. Wheeler has done considerable work on the *Gallagher* mine, but the particulars are not available.

At the *Bluebell* mine, Riondel, development was resumed at the beginning of the year after a period of idleness of nearly two years. The property was equipped for working from below the adit level, whence nearly all its ore must come hereafter, and on July 1st hoisting was begun through a new shaft, the top of which is sufficiently above the adit level to permit the ore to be crushed at the new rock-houses and be trammed directly into the top of the mill, instead of being elevated from the adit level as heretofore.

Actual productive operation began on July 1st and continued to the close of the year, at a gradually increasing rate, so that finally the tonnage milled amounts to well over 200 tons a day.

Development of the lower ground is being continued actively, and so soon as it is made ready for stoping, the management anticipates raising and treating 300 tons a day.

At the close of the year this property employed, all told, about ninety-five men.

WOODBURY CREEK.

The King Solomon Mines Company has done some work on its properties, but shipped no ore.

HAMMIL CREEK.

Considerable development-work was done by a Spokane company on the *St. Patrick* claim late in the fall, but, outside of this, only assessment-work was performed on the various claims, which were fully represented.

DUNCAN RIVER.

The only real development-work done on the river was on the *Red Elephant* group on Hall creek, which is said to have shown marked improvement, and assessment-work was performed on a few of the other claims.

CASCADE CREEK.

Considerable development-work was done on two groups of claims on this creek, one group near Clue lake and the other about seven miles farther down the creek, but no particulars of results are at hand. On Cooper and Meadow creeks assessment-work has been fully kept up, but details of results are not available.

SOUTH FORK OF KASLO CREEK.

On account of lack of railroad transportation, only assessment-work has been performed, but this has been fully kept up.

KASLO CREEK NORTH.

The *Eureka* mine has worked steadily during the year, employing eight men in development-work ; 350 feet of crosscut tunnels and drifts has been made, and the company intends to prosecute the work continuously the coming year.

The *Utica* mine has employed thirty-five men during the year, the pay-roll amounting to \$25,200. The development consisted of building a water-power dam ; 1,400 feet of wooden pipe-line laid, giving 300 feet of head and generating 200 horse-power ; a telephone-line has been put in ; the mine has been developed by extending the lower tunnel 500 feet, and new bunk-houses have been erected ; 664 tons of ore has been shipped, running 150 oz. silver and 15 per cent. lead.

The Deep Mine, Limited.—On account of lack of transportation, work ceased at this mine at the end of February, 1912. During January, 1912, 246 feet of drifting was done. Now that transportation, through the standardization of the Kaslo & Slocan by the Canadian Pacific Railway, is assured, work has been started again, and will be carried on throughout the winter with a crew of about twenty-five men. No ore has been shipped.

Whitewater.—Operated by J. L. Retallack & Co. During the year an average of about twenty-five men has been employed, and 1,517 feet of development was done, and something over 1,012 tons of hand-picked ore has been shipped.

Production of ore has ceased for the winter, and about fifteen men will be employed throughout the winter on development.

OFFICE STATISTICS—AINSWORTH MINING DIVISION.

Free miners' certificates (personal)	203
" " (company)	1
" " (special)	2
New claims recorded	124
Transfers	54
Certificates of work	342
Pre-emptions	6
Certificates of purchase	47
Certificates of improvements (land, 5 ; mines, 26)	31

SLOCAN MINING DIVISION.

REPORT BY ANGUS McINNES, MINING RECORDER.

I have the honour to submit herewith the annual report on the mining operations in the Slocan Mining Division for the year ending December 31st, 1912.

The year 1912 has been marked by a very considerable advancement and progress in the development of the several properties in the different camps in this Division.

The *Standard Silver Lead* mines is on Four-mile creek, near Silverton ; this property has made good progress during the year, and is paying a monthly dividend to the stockholders of \$50,000 for the last ten months. The management is contemplating running the mill two shifts. The principal owners are George H. Aylard, of Victoria, and John A. Finch, of Spokane.

The *Standard* shipped about 4,200 tons of first-class crude ore, and the mill product from nearly 33,000 tons of second-class ore—namely, 5,200 tons of silver-lead and 3,300 tons of silver-zinc concentrates; the metal contents of all products shipped were—silver, 746,000 oz.; lead, 11,792,000 lb.; and zinc, 1,300,000 lb. Large bodies of good ore were opened in the mine.

The *Van-Roi* mines, also on Four-mile creek, about five miles from Silverton, employs 150 men, and worked continuously during the year, shipping at the average rate of six cars of lead and three of zinc concentrates each month; the lead-ores carry about 175 oz. of silver to the ton; development-work is also being kept well ahead.

The *Van-Roi* milled about 57,000 tons of ore, shipping products of which were nearly 2,200 tons of silver-lead and 2,200 tons of silver-zinc concentrates; metals produced were—silver, 543,000 oz.; lead, 2,600,000 lb.; and zinc, 2,000,000 lb. Several new and valuable ore-bodies were discovered in this mine.

The Silverton Mines, Limited.—This property, consisting of the *Hewitt* and *Lorna Doone* mineral claims, is partly owned by and is operated by Monty Davys. They had the misfortune of losing the concentrating plant, or mill, early this year, it being destroyed by fire, but they at once made preparations to start a new mill, which is now nearly finished. The mine is showing up well and will be feeding the mill in a few weeks.

Owing to the destruction by fire of the *Wakefield* concentrator, the Silverton Mines, Limited, which had been using it, was unable to continue the production of much ore, but the erection and equipment of a new mill was undertaken, and arrangements made to use in this a flotation process, as auxiliary to water-concentration. The Silverton Mines, Limited, found the south vein of No. 4 level of the *Hewitt-Lorna Doone* mine, and made ready to commence driving Nos. 8 and 9 levels to cut both the main and south veins at a total depth from the apex of between 1,600 and 1,700 feet.

The *Rambler-Cariboo*, situated in McGuigan basin, owned mostly in Spokane, has worked steadily all year and shipped considerable clean ore. They have also built a fine concentrating plant down on the new spur which the Canadian Pacific Railway built from Three Forks to Bear lake; the mill has been running only a week.

The opening of the *Rambler-Cariboo* mine on several levels down to the 1,400-foot, inclusive, was pushed on, most work having been done in the deep. An aerial tramway was constructed between the mine and the new mill on Scaton creek: the mill equipment was added to, a capacity of 75 tons in two shifts being provided for. Railway transportation was arranged for by making a spur to the mill, at which operations were commenced late in the year. The company shipped some 1,200 tons of ore, containing 108,000 oz. silver and 1,021,000 lb. of lead.

The *Lucky Jim* shipped 2,100 tons zinc-ore since the railroad reached the mine early this spring.

About Sandon, shipment of ore was made from both the *Ruth-Hope* and *Richmond-Eureka* groups; a deep-level adit was driven to cut the big vein on the *Slocan Star*, and similar important underground work well advanced on the old *Payne* property. In the vicinity of Cody, shipment of high-grade silver-zinc ore from the *Deadman* mine of the *Noble Five* group was commenced; the long raise was completed from the extension of the *Last Chance* No. 3 adit up to the old workings of the *Surprise*, and shoots of good ore opened on the lowest two new levels; and more development-work was done on the *Reco*, *Sunset*, *Colonial*, *Noonday*, and *Mountain Con.* Near Three Forks, the *McAllister*, *Lone Bachelor*, *Cinderella*, and *Silver Ridge* were worked, and above Alamo the *Idaho-Alamo* mines were further developed with good prospects of again becoming important producers.

The *Apeex*, situated near New Denver, is operated by Anthony Becker, and is shipping regularly; it is a dry ore.

There are many other smaller properties in the course of development in the camp, but are not yet far enough advanced to be reported.

OFFICE STATISTICS—SLOCAN MINING DIVISION.

Free miners' certificates issued	140
Claims recorded	41
Certificates of work recorded	143
Transfers	15
Revenue collected	\$4,785.10

SLOCAN CITY MINING DIVISION.

REPORT OF HOWARD PARKER, MINING RECORDER.

I have the honour to submit my report for the Slocan City Mining Division for the year ending December 31st, 1912.

While the ore shipments last year were not so large as in former years, it is very gratifying to know that the great amount of development-work done has opened up considerable bodies of high-grade silver-lead ore.

The *Eastmont*, situated at Ten-mile creek, has had ten to fifteen men employed during the year chiefly at development-work; a large body of ore was encountered during the month of November, and preparations are now being made for shipping on an extensive scale.

The *Meteor*, on Springer creek, shipped 50 tons of ore besides doing development-work; the ore yields about \$200 per ton.

The *Black Prince* shipped some 52 tons during the year.

The *Lily B*, operated by the Hobson Mining Company, has extensively developed its property, and although no ore was shipped during the year, it is believed that a considerable quantity could be shipped at any time. The ore is high-grade silver-lead.

The *Hamilton* group, owned by Gillette & Co., has done a further 125 feet of tunnelling, and is now hauling ore for shipment to the Trail smelter. This ore assays high in silver and gold.

The *Kilo*, situated on Lemon creek, was closed down for a number of years, but was reopened about three months ago. Seventeen men are now employed at the mill and in the mine. The ore is gold-bearing quartz; 100 tons taken from the dump and treated at the mill yielded \$13.25 a ton in gold. In the month of December the mill was operating for eleven days, and the ore treated (from the mine) yielded a gold brick valued at \$1,800.

It is believed that the good showing made by the *Kilo* will give considerable impetus to the gold-mining industry at Lemon creek; properties which are now idle are expected to be working in the spring.

OFFICE STATISTICS—SLOCAN CITY MINING DIVISION.

Free miners' certificates (ordinary)	90
" " (company)	2
Certificates of work recorded	129
Locations recorded	41
Conveyances recorded	12
Certificates of improvement recorded	5

 TROUT LAKE MINING DIVISION.

REPORT OF F. MUMMERY, MINING RECORDER.

I have the honour to submit herewith my report of the progress of the mining industry in the Trout Lake Division for the year 1912.

The discovery of a large body of silver-lead ore in the *Ajax* mine and the shipment of high-grade ores from the *Lucky Boy*, *Horseshoe*, and *Nettie L.* have done much to restore confidence in the mining industry in the Trout Lake District.

Silver Cup.—Shipments of ore totalled 320 tons, containing 44 oz. gold, 23,500 oz. silver, and 156,000 lb. lead. Development consisted of raises, 46 feet; drifts, 423 feet; total, 460 feet. An average of seventeen men was employed.

Ajax.—This property, situated on *Nettie L.* mountain, and one of the *Nettie L.* group, owned by the Ferguson Mines, Limited, has lain idle for years. Last June Superintendent Merry put two men to work. Shortly after, they cut what is probably a large body of silver-lead ore of a shipping grade. Up to the present time they have drifted a total of 125 feet, of which 65 feet is on the ore, which shows an average width of 5 feet. During the month of December 85 tons was shipped, and shipments will be continued until the close of navigation on Trout lake; eight men were employed in December.

Nettie L.—This property was under lease to Daney & Co. during the latter part of the year. Sinking, 53 feet; drifting, 73 feet; men employed, 6; ore shipped, 31 tons.

Horse Shoe.—Owned by Craig & Hillman, situated on Trout creek, about three miles west of Trout lake. Drifting, 47 feet; sinking, 73 feet; men employed, 3; 5 tons of ore shipped, giving returns of \$130 a ton.

L.B.—Owned by the Chestnut Hill Mining Company, of Philadelphia. Work done consisted of surface prospecting and stoping ore; 28 tons of high-grade ore was shipped, a portion of which gave values of over 300 oz.; from four to eight men employed.

Fidelity.—Situated about three miles north-west of Gerrard; has been under lease to Lamphere & Co. They have been rawhiding ore during the month of December, but will not ship until after the New Year.

Canadian Boy.—This group, owned by Kirkpatrick, Daney, and others, is situated at Seven-mile, on the South fork of the Lardeau, and has a fine showing of silver-lead ore, averaging about 90 oz. in silver a ton.

C.B.—Work during 1912 consisted in sinking 32 feet and drifting 37 feet. There is a quantity of sacked ore on the dump, but no attempt will be made to ship at present.

Broadview Group.—Situated on Great Northern mountain, three miles north of Ferguson. Four men employed; 168 feet of tunnel; a new vein was cut in the tunnel, but I have not been able to obtain particulars.

OFFICE STATISTICS—TROUT LAKE MINING DIVISION.

Free miners' certificates (ordinary).....	79
" " (company).....	2
Bills of sale, agreements, etc., recorded.....	23
Certificates of improvements recorded.....	7
Certificates of work issued.....	150
Mineral claims recorded.....	46

NELSON DISTRICT.

NELSON MINING DIVISION.

REPORT OF W. F. TEETZEL, GOLD COMMISSIONER.

I have the honour to submit the annual report on the Nelson Mining Division for the year ending December 31st, 1912.

GENERAL REMARKS.

The ore production for the Nelson District was heavier in 1912 than it has been for some years. This was due to the operation of the mill at the *Mother Lode* mine on Sheep creek for five months, the steady operation at full capacity of the *Queen* 20-stamp mill, and increased shipments from the *Emerald*, the beginning of shipments by the *H.B.*, and the renewal of shipments by the *Queen Victoria* and *Yankee Girl* mines.

The developments in the mining industry for the year have been of very great importance to the district, and the year 1913 should be a banner one. The purchase of the controlling interest in the *Silver King* by the Consolidated Mining and Smelting Company of Canada, and the immediately following resumption of work at that property, cannot help but greatly improve conditions in the district. Another factor of importance is the entrance of the British Columbia Copper Company into the district, by the purchase of the *Queen Victoria* copper-mine at Beasley, and the taking of a lease and bond on the *Eureka* copper-mine on Granite mountain. Neither of these properties are prospects, but are developed mines, and the operation of them by this strong company means a great increase in the ore production of the district.

During 1912 about 37,000 tons of gold-ore was milled by the stamp-mills, and 16,000 tons of ore or concentrates shipped to the smelter or concentrated, bringing the total ore production for the district well up to the 53,000-ton mark.

About 300 men were employed in the mines during the year.

EAGLE CREEK.

The property of the Eureka Copper Mines, Limited, was bonded to the British Columbia Copper Company in July last. At that time there was about 3,000 feet of development-work done, and four shoots of ore opened up, in virgin ground, at a depth of 250 feet, besides considerable ore in the old workings. Since then two new ore-shoots have been found. A winze sunk from the tunnel level on one of the ore-shoots, for over 50 feet, shows about 2 feet of ore running from 5 to 15 per cent. copper and from 30 to 90 oz. of silver. A raise from the level has opened up 9 feet of carbonate-ore. With the exception of the ore in the winze, the ore is nearly all carbonates. The average of 1,000 tons shipped in 1907 and 1910 was 5 per cent. copper, 0.17 oz. of gold, and 4.3 oz. of silver. Wherever, as yet, the sulphides have been found the values are higher. A road, with a good grade, and an aerial tramway have been surveyed to the property, and construction-work will be started in the spring. The property will become a steady shipper toward the end of the summer. A lower crosscut tunnel will probably be run as soon as shipments are started.



Pack-train crossing Klondike River.



Northern Prospector—packing Supplies on Dogs.

Granite-Poorman.—At the *Granite-Poorman* the stamp-mill has not been operated at its full capacity this year, owing to numerous dykes faulting the ore, making the mining of a sufficient tonnage to keep the mill running a difficult proceeding. Since the lead crossed under the creek, it has run fairly well with the surface, at no great depth. In the tunnel level, where the ground is hard, there is a long and continuous ore-shoot, very well mineralized and having a width of, on the average, from 1 to 3 feet. The ground below the tunnel level should not be so badly faulted, as the dykes that exist there should be showing in the workings on the *Poorman* vein. It is the intention of the company to drive a lower crosscut tunnel this year to tap the lead lower down, and drift under this ore-shoot.

BEASLEY.

Queen Victoria.—The *Queen Victoria* was purchased by the British Columbia Copper Company on November 1st. There is about 40,000 tons of low-grade ore, carrying an excess of lime, opened up at present, that can be mined at a profit with copper at the present price. The mine is equipped with a power-line, transformers, a motor, and air-compressor, 2-bucket aerial tramway to the railroad, ore-bunkers, and a full equipment of machine-drills, tools, etc. It is expected that shipments of from 60 to 100 tons a day will be made to the company's smelter at Greenwood during the year. Over 1,000 tons was shipped in November and December.

Molly Gibson.—The *Molly Gibson*, on Kokanee creek, mined about 12,000 tons of ore and shipped 2,419 tons of ore and concentrates to the Trail smelter during the year. Since the acquisition of this property by the Consolidated Mining and Smelting Company of Canada, an aerial tramway four and a half miles long has been installed, to convey the ore and concentrates from the mill over the worst part of the road to the lake, as well as to haul up mine supplies; the mill has been remodelled; a new power plant with an additional air-compressor has been installed, by using the waste water from the mill-wheels over again lower down, and a steady policy of development carried out at the mine. An 800-foot crosscut tunnel to give an additional depth of 240 feet was completed during the year, and a raise is being run from this to No. 5 level. Some drifting on the lower level showed that the ore continued downward to that level, in about the same quantity and quality as in the bottom of the level above. Surface work during the year revealed the existence, over a distance of 2,000 feet, of surface showings similar to those under which are the present workings. When sufficient development has been done this mine should be a heavy producer for some years to come.

Venus.—A. H. Gracey has taken a lease and bond on the *Venus*, and drove a lower crosscut to the vein, on which drifting is now being done. A good showing of ore in the bottom of the tunnel above, carrying good values in gold, has already been encountered in the drift.

Silver King.—The Consolidated Mining and Smelting Company this fall purchased a 75-per-cent. interest in the Silver King Company, and immediately started to rebuild the mine plant which had been destroyed by fire. At present about forty men are employed. The aerial tramway will be put in shape and shipments started before spring if possible. There are large bodies opened up of a lower grade of ore than that formerly shipped, on which a good profit can now be made, as well as considerable ore of the class formerly shipped. The mine will probably be a heavy producer in the near future, and its operation once more means much to the district.

Perrier.—At the *Perrier* a small mill is being constructed to mill the free-gold ore of this property, and a small tonnage may be looked for during the year. The owners have a nice little lead, but have been hampered by lack of capital.

YMIR DISTRICT.

Wilcor.—The *Wilcor* mine, on Wild Horse creek, about seven miles from Ymir, has been developed steadily during the year. A considerable tonnage of free-milling ore has been opened up; development will be continued until a sufficient tonnage is in sight so that the mill, when once started again, will be able to run steadily at full capacity. The property is equipped with an electric-power plant, air-compressor, hoist, two aerial tramways, a 10-stamp mill with concentrating-tables, and suitable mine buildings.

Yankee Girl.—The *Yankee Girl* resumed shipments this fall, shipping to the Trail smelter 700 tons of ore, carrying about \$15 in gold. The ore-shoot at present opened up is about 160 feet long and from 2 to 3 feet in width; the best ore is steel-galena. There are very large bodies of low-grade sulphides opened up, but their value or full extent has not as yet been determined. The mine is equipped with a 2-bucket tramway to the wagon-road, at a point about a mile and a quarter from the Great Northern Railway station at Ymir, a power plant and a 3-drill compressor, and the necessary mine buildings. About twenty men are employed at present.

Dundee.—The *Dundee* adjoins the *Yankee Girl*. A tunnel is being driven on the lead at present to catch an ore-shoot opened up in the old shaft, at a depth of about 900 feet below the collar of the shaft, which is down over 200 feet. The point driven for should be reached this summer.

Jennie Belle or Ymir Mint.—Some high-grade ore carrying \$100 to the ton in gold, silver, and lead was opened up in a prospect-shaft last year, and a crosscut tunnel to give 50 feet depth is being run to get under this ore.

May Blossom.—Some high-grade gold-silver-lead ore has been opened on the *May Blossom*. A drift on the lead is being run at present, and the ore encountered is being sacked ready for shipment in the spring. A small tonnage of high-grade ore may be looked for from the property as soon as development has been carried sufficiently ahead.

Bi-Metallic.—The purchase of this property by a subsidiary company of the Hobson Silver Lead Company was completed this summer. About 300 feet of development-work was done during the year.

SHEEP CREEK DISTRICT.

Lost Cabin.—At the *Lost Cabin*, on Hall creek, about 300 feet of development-work was done during the summer.

Queen.—The *Queen* 20-stamp mill was operated steadily during the year, except for minor shut-downs, caused by accidents to the flume-line. The tonnage produced was the heaviest yet from the property, being in the neighbourhood of 11,300 tons; besides the gold saved by amalgamation, 565 tons of concentrates was shipped to the Trail smelter. The ore was all obtained from No. 6 level from drifting and from the ore-shoot at the shaft. The mine is worked on the shrinkage system, and about one-third of the ore from this ore-shoot is at present broken in the stope. The ore-shoot found on No. 5 level across the creek was encountered on No. 6, and drifted on for a distance of 200 feet, and still shows strong in the face. For 150 feet the drift was carried the full width of the ore, which is from 12 to 14 feet. From there on the drift will be carried single width until the end of the ore-shoot is reached, when it will be widened out. While running two machines in the face, enough ore was taken out to keep the mill running. A raise is being run to No. 5. Some changes to the mill are contemplated in the near future, to further increase the saving effected, which at present is not as good as it should be.

Kootenay Belle.—Nothing was done at the *Kootenay Belle* this year, in spite of the splendid showing of ore opened up by the development-work already done.

Vancouver.—A small shipment of 17 tons of high-grade ore was made from the *Vancouver Fraction* adjoining the *Queen*. Humphreys & Fisher, the owners, are driving a short crosscut tunnel this winter.

Dominion Mountain.

Golden Belle and Clyde-Belt.—At the *Golden Belle* work was discontinued this spring and the property was sold by Sheriff's sale. Nothing was done at the *Clyde-Belt*.

Mother Lode.—After many annoying delays the new mill at the *Mother Lode* was put into commission, and ran at full capacity for the last five months of the year. The mill is equipped with 10 stamps, crushing to 12 mesh, a 5- x 20-foot tube-mill, amalgamation-plates, and a complete Merrill cyaniding plant. The average daily tonnage treated is close to 70 tons. The saving effected is stated to be over 98 per cent. of the gold values. Over 13,440 tons was put through in the five months, and a good profit is said to have been made. A steady year's run of the mill would add greatly to the gold production of the district.

A very promising lead is being opened up over the summit from Sheep creek, on the Cultus Creek side; the ore is galena and carbonate, carrying good values in gold and some silver. It is owned and is being developed by the owners, the Laib Brothers, by whom it was located.

Nugget.—The *Nugget* has been closed down for most of the year, notwithstanding the considerable tonnage of ore opened up in the mine. It is expected that another crosscut tunnel will be run shortly.

Silver Lead.—On Fawn creek, below the *Nugget* in the granite-lime belt, Macleod and MacColeman uncovered a large surface showing of silver-lead ore. They ran 60 feet of a crosscut, but did not reach the main ore-shoot.

Hudson Bay.—The *Hudson Bay* shipped 742 tons of silver-lead-carbonate ore to the Trail smelter this year. A large body of this ore is opened up, and shipments will be continued steadily. Eight miners keep four 4-horse teams hauling 7 tons to the load busy hauling the ore to Salmo. In addition to the lead-carbonates, there is a heavy tonnage of zinc-carbonates opened up.

Aspen.—About a mile and a half farther up Deer creek is the *Aspen* group, at which a crosscut tunnel is being driven to get under a surface showing of dry silver-ore at a depth of 50 feet.

Emerald.—An air-compressor was installed at the *Emerald* this year, and a crosscut tunnel driven to obtain more depth. The vein is rather flat, and a raise is being run from this crosscut to reach the ore, but is not yet up high enough. The ore is a low-grade silver-lead ore, and 1,560 tons was shipped to the smelter at Trail this year.

Silver Dollar.—The *Silver Dollar* is under lease and bond to the Consolidated Mining and Smelting Company of Canada. The mine is just on the outskirts of the town of Salmo. The ore is a silver-lead ore running high in zinc. A boiler and a small hoist were installed this summer, and a shaft is being sunk which at present is down about 100 feet.

ERIE DISTRICT.

Arlington.—The *Arlington* mine at Erie shipped 762 tons of gold-ore to the Trail smelter during the year. The Hastings B.C. Syndicate leased the property to William Barker at the end of May, and he is at present operating it.

Second Relief.—The *Second Relief* on the North fork of the Salmon river, fourteen miles from Eric, has been operated steadily for the last five months of the year. There is considerable ore opened up at present, and a probability that the owners will be able to operate the mill steadily for some time. Over 3,500 tons of ore was treated at the mill this year, and 97 tons of concentrates shipped to the Trail smelter, besides the gold recovered by amalgamation. The property is equipped with a 10-stamp mill using water-power, a 14-drill air-compressor, machine-drills, and suitable mine buildings.

OFFICE STATISTICS—NELSON MINING DIVISION.

Free miners' certificates (ordinary).....	620
" " (special).....	3
Claims recorded (mineral).....	351
" (placer).....	7
Assessments recorded.....	635
Transfers and other documents of title recorded.....	135

Revenue.

Free miners' certificates.....	\$3,221 25
Mining receipts.....	3,736 05

NELSON MINING DIVISION.

PLATINUM AT NELSON.

NOTES BY PROVINCIAL MINERALOGIST.

A further endeavour was made this year by the Department to give official confirmation to the reported finding of platinum in certain dykes near Nelson, B.C., as much local interest had been manifested in the subject.

With this object in view the writer was instructed to obtain samples of the dykes: these samples he took personally, assisted by an Inspector of Mines, in the presence of the parties interested and from places indicated by them: in addition to these samplings, further samples were handed in by owners from portions of dykes which they thought contained platinum.

The matter had, however, resolved itself into, not a question of sampling, but of the assaying of the samples, and this the Department decided to refer direct to some of the best-known and impartial assayers in Canada, England, and the United States, whose results are given, without any further comment, in the following report made by the writer to the Honourable the Minister of Mines in February, 1913:—

Sir, —I beg to report as follows regarding my investigations into the alleged finding of platinum, and metals of that group, in certain dykes in the vicinity of Nelson.

Last year I had a number of samples sent to me: these I sent to several eminent chemists for assay, all of whom reported that they were unable to detect even a trace of platinum, or metals of that group, in the samples tested.

These results were published, in detail, in the Report of this Department for 1911 (page 165, *et seq.*).

On October 1st, 1912, I proceeded to Nelson—at your request—to obtain other samples from the same and other localities, so that our samples would represent a wider range.

I made you a detailed report of my trip to Nelson, under date of December 18th, 1912, which may be briefly summarized as follows:—

I personally took the following samples, with the assistance of James McGregor, Inspector of Mines, and in the presence of the parties interested:—

- No. 7201—Devlin dyke, general sample, upper and softer portion of dyke.
- No. 7202—Devlin dyke, general sample, lower and harder portion of dyke.
- No. 7203—Patenaude dyke, general sample, across dyke.
- No. 7204—Patenaude dyke, special sample of 2 feet next to contact.
- No. 7205—Beelzebub dyke, *Granite-Poorman* mine, general sample.
- No. 7206—Beelzebub dyke, *Granite-Poorman* mine, special sample of foot-wall.
- No. 7207—Greenhorn dyke, *Granite-Poorman* mine, general sample.
- No. 7208—Granite dyke, *Granite-Poorman* mine, general sample. (It was from this dyke that the 50 tons milled was taken.)
- No. 7209—Hardscrabble tunnel, No. 1 chute, general sample of dyke.

In addition to the samplings made by me personally, the following samples were supplied to me:—

- No. 7211—Monaghan dyke, general sample, sampled by owner.
- No. 7212—Monaghan dyke, general sample, 2 feet next hanging-wall, sampled by owner.
- No. 7269—McQuarrie & Robertson dyke, samples supplied by owners.
- No. 7215—Sample given by Thomas Gough, manager *Granite* mine, to the Provincial Mineralogist, and said to be a sample from “concentrates” made on Witley table, in 1911, during a run through the *Granite* mill of 50 tons dyke-matter, taken from same dyke as was sample No. 7208.

As the ratio of “concentrates” to the ton of ore is unknown, this sample would not determine the amount of metal in the dyke, and was taken only to determine whether there was any platinum present even in ore so concentrated.

It was A. G. French who was primarily responsible for the alleged discovery of platinum, and I found in an interview I had with him that he claimed that the metals of the Platinum group “were so elusive that no ordinary assayer, even the best, could find them upon assay, but that he (Mr. French) by his great experience had found a method of assaying that would show them.”

I obtained from Mr. French a description of his method of assaying, which I had typed, and submitted a copy to him for correction; this was returned, with slight corrections, and initialled by him.

To show me the manipulation of his method of assay, Mr. French had some samples run through in my presence; those on dyke-matter were, however, abandoned, but a sample of “concentrates” was run through to the end.

The samples, reagents, and operators were of Mr. French’s selection, which was, however, unimportant, as it was only the *manipulation* I was there to see, and the result was of no consequence, as of course I could not certify to the results without control of the operations.

Upon my return to Victoria, I had the samples I had obtained divided, each into several identical samples.

There has never been any question as to the samples or sampling—the whole question has been as to the assaying of the samples; so, to obtain the best expert determination on this point, I sent sets of four samples, each set identical, to a number of the most expert chemists, asking that they be “tested, with the greatest possible care, for metals of the Platinum group, for even a trace, and if found, then in what quantities.”

With each of these sets of samples I sent a copy of Mr. French's method of assaying.

Sets of samples were sent to the following parties, each set being identical and comprising Nos. 7203, 7205, 7211, and 7215:—

Canadian Government Bureau of Mines, Ottawa, courtesy of Dr. Eugene Haanel; this laboratory does all the chemical work of the Bureau of Mines and of the Geological Survey of Canada.

Johnson, Matthey & Co., London, England, Assayers to the Royal Mint, one of the first authorities in England on platinum-assaying.

Dr. Frederic P. Dewey, Washington, D.C., Chief Assayer to the U.S. Mint and the greatest authority in America on detection of minute quantities of platinum, the author of numerous papers on this special subject. (These were sent through the U.S. Geological Survey, whose courtesy and Dr. Dewey's is hereby acknowledged.)

Ledoux & Co., of New York, one of the best-known assaying firms in America.

Consolidated Mining and Smelting Co.'s laboratory at Trail, whose chemists have become expert in this matter.

British Columbia Government Laboratory, Mr. Carmichael and Mr. Whittaker working independently, making two sets of assays.

The S. S. White Dental Manufacturing Company, manufacturers of platinum goods, New York.

With the notable exception of the S. S. White Dental Manufacturing Company (which will be remarked on later), each and every one of these experts to whom the question had been submitted reported that they were unable to find even a trace of any metal of the Platinum group.

The following are extracts from some of the letters accompanying the certificates of assay:—

Johnson, Matthey & Co.: “Our results are again of an absolutely negative character, and we can affirm that the samples contain neither platinum nor metals of the Platinum group.”

Dr. Dewey reports:—

“Washington, D.C., January 21st, 1913.

“*The Director of the Mint.*

“*STR.*—None of the samples from the Provincial Mineralogist of British Columbia, forwarded to us by the United States Geological Survey, show any platinum.

“No unusual occurrence was observed during the assay, but no special test could be made for Canadium.”

“(Signed.) FREDERIC P. DEWEY,

Assayer, Bureau of the Mint.”

Ledoux & Co.: “In examining these samples we have used assay charges four times as large as usual, and the results are negative in every case; we can assure you that none of these samples contain even a trace of platinum or any other members of the Platinum group.

“We have assayed these samples by the method described as A. Gordon French's method, a sketch of which accompanied your letter.”

Mr. Carmichael and Mr. Whittaker, in addition to the four samples mentioned, also assayed each and every one of the samples brought from Nelson.

Mr. Carmichael, Provincial Assayer, reports as follows :—

“These assays were made with the greatest care, both by the assistant assayer (Mr. Whittaker) and myself personally, and I must now report that in no case were we able to find even a trace of platinum or any of the metals of the Platinum group.

“The samples were tested both by Mr. French’s method and by the generally accepted methods, and, as a result, I am certain they do not contain any of the Platinum group metals within the limits stated—that is, not as much as one-thousandth part of an ounce to the ton.

“To test whether there was even an ‘infinitesimally minute quantity’ of platinum present, as is frequently found in the gold of this Coast, we ran through the furnace, by Mr. French’s method, 60 charges of 20 grammes each of sample No. 7215, ‘concentrates,’ equal to 1,200 grammes of material, combining all the buttons into one in the final cupellation.

“We next took 42 charges of I A T (29.166 grammes), making 1,225 grammes of material) which we ran through by the regularly adopted methods, joining all the beads into one on the final cupellation. These two beads were treated separately, and any possible platinum condensed into a solution of about 0.05 c.c. in volume, and each of these solutions tested qualitatively, by potassium iodide, showed the presence of platinum ‘in infinitely small quantity’; as near as it is possible to estimate, I should say the platinum present amounted to about sixteen (16) cents’ worth of platinum in 10,000 tons of ore, an amount quite negligible and only discernible upon treating a great amount of material—more than 1,220 grammes.

“I have carefully looked into the method of assay as proposed by Mr. French, and have experimented with it, and I fail to find any merit in it, either from a chemical or practical viewpoint.

“(Signed.) HERBERT CARMICHAEL,
B.C. Government Assayer and Analyst.”

The S. S. White Dental Manufacturing Company’s assayers—as already noted—report that they find platinum and gold in each of the four samples sent them, as follows :—

Sample.		
No. 7203—Platinum, 0.033 oz. ; gold, 0.035 oz. per ton.	No other precious metals present.	
No. 7205—Platinum, 0.088 oz. ; gold, 0.108 oz. per ton.	“	“
No. 7211—Platinum, 0.042 oz. ; gold, trace.	“	“
No. 7215—Platinum, 0.119 oz. ; gold, 1.136 oz. per ton.	“	“

The company, as such, has a high commercial standing, but of the skill or experience of the assayers employed by the company I have no means of judging. The company, however, is engaged in the manufacture on a large scale of platinum goods, and its laboratory is naturally an adjunct to its manufacturing business, so that it is quite possible, and even probable, that its laboratory—and even utensils—were so saturated with platinum, as dust and otherwise, as to render any samples treated there open to grave suspicion of contamination and the results subject to question.

The firm does not do assaying or chemical analysis as a business—although in this case it was paid for these assays—and has no public rating as analysts. My only reason for sending samples to this firm was the fact that a number of persons in Nelson had received from it returns of platinum in these dykes, and it was largely due to these assays that local credence was given to the alleged discovery, and that this “platinum excitement” was started.

Some years ago we had an experience with another firm of platinum manufacturers—near New York—who reported, to prospectors, high platinum results in ore, which subsequent investigations proved not to be founded on fact; this was accounted for by contamination in the laboratory of the platinum-works, the probability of which, in such a laboratory, is known to any assayer of experience. In fact, it is usual to exclude all bullion-assaying from the room in which assays of ore are made.

In making this investigation I have simply obtained the samples and Mr. French's method of assaying. These I have submitted for the best expert advice obtainable, and in making this report to you of the result of the investigation, I do not need to express any opinion of my own. I merely give you the verdict of the experts employed, which may be summarized as follows:—

Seven of the most expert assayers in England, the United States, and Canada—including the Geological Surveys of the two latter countries—report that not even a trace of platinum is present.

The laboratory of a firm of platinum manufacturers reports from 0.033 to 0.088 oz. of platinum per ton in dyke samples and 0.119 oz. per ton in the "concentrates."

Any comment on the above results appears to me to be unnecessary.

ARROW LAKE MINING DIVISION.

REPORT OF WALTER SCOTT, MINING RECORDER.

I have the honour to submit the annual report on the Arrow Lake Mining Division for the year ending December 31st, 1912.

On the *Millie Mack* group, situated in the vicinity of Burton, H. E. Foster, the owner, had a force of men doing development-work upon the property this summer.

On the *Big Ledge*, situated on Bald mountain, on the west branch of Pingston creek, no extra development-work has been done this season, further than the annual assessment-work. Upon this property there is a large showing of zinc-ore.

OFFICE STATISTICS—ARROW LAKE MINING DIVISION.

Free miners' certificates	27
Certificates of work recorded	19
Mineral claims recorded	2
Bills of sale recorded	2
Cash paid in lieu of work	\$100 00



Klappan River—Tributary of Stikine—above the Ford.



The Indian Graveyard—head of Little Klappan.

ROSSLAND DISTRICT.

TRAIL CREEK MINING DIVISION.

REPORT OF H. R. TOWNSEND, GOLD COMMISSIONER.

I have the honour to submit the report of mining operations in the Trail Creek Mining Division during the year 1912.

The Consolidated Mining and Smelting Company of Canada, Limited, and the Le Roi No. 2, Limited, were the principal operators, and the properties operated by them are situated on Red mountain. There has been considerable prospecting and development-work carried on, however, in what is locally known as the "South Belt."

The Centre Star Group.—This group is owned and operated by the Consolidated Mining and Smelting Company of Canada, Limited, and comprises the following claims: *Centre Star, War Eagle, Iron Mask, Mugwump, Idaho, Enterprise, Virginia, Red Mountain, Stewart Fraction, Pilgrim, City of Spokane, Iron Horse, Monte Christo, Butte Fraction, and Lulla Fraction.* The number of men employed was 440, of whom 338 were underground and 102 on surface. The net weight of ore produced was 160,199 tons, having an assay content of 96,771 oz. of gold, 49,130 oz. of silver, and 1,741,384 lb. of copper. The development-work for the year consisted of 6,209.5 feet of drifting, 3,003.5 feet of crosscutting, 1,134 feet of raises, and 9,696.2 feet of diamond-drilling.

The Le Roi Group.—This group is also owned and operated by the Consolidated Mining and Smelting Company of Canada, and consists of the *Le Roi, Pack Train, Black Bear, Ruby Fraction, Pearl Fraction, Durham, and Treadwell.* One hundred and ten men were employed, eighty-eight being underground and twenty-two on surface. The net weight of ore produced was 47,373 tons, having an assay content of 20,468 oz. gold, 21,152 oz. silver, and 936,170 lb. of copper. The development-work consisted of: drifts, 2,679 feet; crosscuts, 1,162.5 feet; raises, 518 feet; and diamond-drilling, 10,562.5 feet.

The Le Roi No. 2 Group.—This group consists of the *Annie, Annie Fraction, Josie, No. 1, and Poorman.* The total area of these claims is only 65.32 acres. The number of men employed during the year was from 125 to 130. The gross tonnage of ore mined was 35,898 tons, 18,758 tons of which was shipped for treatment, and 17,140 tons of second-class ore was milled on the premises; from the ore shipped, 12,776 oz. gold, 11,673 oz. silver, and 487,894 lb. of copper was obtained, while the ore that was milled yielded 1,770 oz. gold, 1,062 oz. silver, and 36,227 lb. of copper. The approximate value of all being \$372,000.

Blue Bird.—This property is owned and operated by the Rosalia Mining Company, Limited, and is one of the "South Belt" properties. The shaft has been continued to a depth of 350 feet and the bottom is all in ore. The ore shows an increase in copper values with depth. Five men were employed, and operations were suspended when the snow set in, but are to be resumed in the spring. Lack of capital prevents a more rapid development. About 86 tons of ore was shipped to the smelter.

Richmond.—This is also a South Belt property located near the *Blue Bird*. The work done has been for the purpose of proving the property, and has given sufficient promise to warrant the formation of a company and the installation of machinery, for which the necessary buildings and preparations are now being made.

Phoenix.—Another of the South Belt claims being worked under lease by M. Trehwella. Several cars of ore right from the surface have been shipped to the smelter, with satisfactory results.

L.X.L.—This is one of the old claims of the camp situated on O.K. mountain, and has been operated under lease by R. T. Evans. Nothing has been done since April, but work is to be resumed in the spring as soon as the snow goes.

Inland Empire.—Situated on Grenville mountain near the western boundary of the Mining Division, and owned and operated by the Inland Mining Company, Limited. The work for the year has been experimental, 2,200 tons of ore being milled on the ground and 43 tons of concentrates shipped to the Trail smelter.

OFFICE STATISTICS—TRAIL CREEK MINING DIVISION.

Mineral claims recorded	44
Certificates of work	32
Certificates of improvement	1
Bills of sale	14
Free miners' certificates (company).....	8
" " (special).....	2
" " (individual).....	127

BOUNDARY DISTRICT.

NOTES BY WM. FLEET ROBERTSON, PROVINCIAL MINERALOGIST.

The Boundary District, the mines of which together produce more copper than those of any other part of Canada, led in 1912 in British Columbia in respect of both the quantity of ore mined and the total value of metals produced. The ore-output of the district for 1912 was 1,989,084 tons—nearly 2,000,000 tons. The ore-output of the mines in the Greenwood and Grand Forks Divisions was 1,918,628 tons, as compared with 1,187,000 tons in 1911, and 1,654,000 tons in 1910. (It will be remembered that the strike at the Crownsnest collieries adversely affected production in 1911.) It has been customary to include the production of Osoyoos Division with that of the others above mentioned, but, leaving that out for the present, the recovered output of metals from Greenwood and Grand Forks Divisions in 1912 is as follows: Gold, 67,442 oz.; silver, 389,311 oz.; and copper, 33,372,199 lb. For statistical purposes there will be added 37,407 oz. of gold from the Hedley Gold Mining Company's mines in Osoyoos Division. The total value of the output (including \$773,203 from Hedley) was approximately \$7,846,580, which constitutes a record for the year as compared with that of metalliferous minerals from other districts in the Province. It will not, however, be as high as the Coast District for total value of all mineral production, for there coal and structural materials reached a total value in 1912 of \$8,084,738, in addition to \$3,010,818 for metallic minerals.

GREENWOOD MINING DIVISION.

The British Columbia Copper Company, Limited, also had an active B.C. Copper Co. and successful year. The company's chief sources of ore-supply are its *Mother Lode* mine, near Greenwood, and the *Raahide* mine, near Phenix. The latter is owned by the New Dominion Copper Company, but since the British Columbia Copper Company possesses a controlling interest in the New Dominion Company, and works its mines, the several properties may be referred to as if owned by the same company.

Official returns show that of a total of 665,289 tons of ore received at the company's smelter from its mines in the Boundary District, the *Mother Lode* sent 385,646, the *Raahide* 261,453, the *Wellington Camp* group 10,354, the *Emma* 7,431, and the *Athelstan* 405 tons. The *Queen Victoria* in the Nelson Division shipped to the company's smelter about 1,000 tons, while some 33,000 tons was received from the *Lone Star* and *Napoleon* mines, the last two being situated south of the International Boundary-line, in the adjoining State of Washington. Leaving out of account the metals in ores from the United States and Nelson Mining Division, the *recoveries* were, approximately: Gold, 21,818 oz.; silver, 113,903 oz.; copper, 10,941,701 lb. The assay value of the ores was considerably higher.

At the *Mother Lode* mine the year's work consisted chiefly of drilling in advance of breaking down pillars and benches of ore, and this drilling was kept far ahead of ore-breaking requirements, preparatory to blasting with electric-fired charges. The method followed was to drill and load from 1,500 to 2,500 holes, averaging about 12 feet in depth, and connect them up in groups of twenty-five to a group. All were provided with electric fuses and fired

simultaneously. Each of these blasts broke down thousands of tons of ore, in some cases enough to last for shipping during several months. Fire so badly damaged the power plant at the *Emma* on February 27th that no work has since been done in that mine. The *Wellington* group mines were worked until June, but not since; it is planned to do much exploratory work on this property next season. As there is a large quantity of ore available in the company's *Lone Star* mine, the ore of which is very siliceous, concentration tests were made to determine the best way to eliminate the excess of silica, and this problem is now in a fair way toward being solved.

The only one of the New Dominion Copper Company's mines that was operated on a large scale in 1912 was the *Rawhide*, situated near Phoenix. Development-work consisted of some 2,650 feet of raises and drifts. Included in the new work was a branch of the lower tunnel, connecting with the ore-shipping bins; the total of ore shipped has already been stated. An electric haulage system was put in, to take the place of hauling with horses.

Early in July the company's general manager, Edward G. Warren, met with an automobile accident, which resulted fatally. He was succeeded by Frederic Keffler as acting general manager, until late in the year, when Oscar Lachmund was appointed general manager.

The following is the report of the acting general manager to his directors for the fiscal year of thirteen months ending December 31st, 1912; the end of the fiscal year was changed during the year to correspond to the calendar year, hence this statement is for thirteen months:—

“For the fiscal year of thirteen months ending December 31st, 1912, the following review of the company's operations is herewith submitted:—

“Shipments were made from the company's mines as follows:—

<i>Mother Lode</i>	410,686 tons.
<i>Wellington Camp</i>	9,935 “
<i>Lone Star and Washington</i>	2,101 “
<i>Napoleon</i>	17,118 “
<i>Queen Victoria</i>	1,080 “
Total.....	440,920 “

“*Mother Lode Mine*.—The transverse-stope method of mining has been followed throughout the year, and has proved most successful in extracting the maximum quantity of ore at a minimum of cost. The tonnage shipped is the greatest for any one year in the history of the mine, and the cost of crushed ore f.o.b. cars at the mine has been the lowest—namely, 56.58 cents per ton. The drilling of new ground has been kept well ahead of requirements, there being at the close of the year 5,000 holes, aggregating 65,000 lineal feet, in readiness to blast.

“The ore reserves have not been materially increased during the year, and the average grade of the ore mined has remained below the normal grade of former years.

“The mining plant has been maintained in good condition, and the large tonnage has been extracted without serious accidents of any sort to either men or machinery.

“*Wellington Camp*.—The ore developed here was mined out during the first seven months of the fiscal year, and in June the mine was closed for the time being. There is a large area of unprospected territory included within the company's holdings in this camp, but owing to extensive prospecting in other localities it was thought best to postpone further operations at the *Wellington* until a later date:

"*The Lone Star and Washington Mine.*—This mine was operated in June, July, and August only, as, on account of the refractory nature of the ore, but little could be smelted directly. Working tests on large lots of the ore, using ordinary water-concentration methods, did not prove sufficiently successful to warrant the erection of a concentration plant. We are, however, making tests on other lines, which so far have proved satisfactory, and lead to the expectation that the problem of successful concentration and elimination of the refractory constituents of the ore will shortly be solved. The 300,000 tons of developed ore on this property, comprised within less than 7 per cent. of its area, together with its comparatively high grade, make the ultimate solution of the problem of treatment a most important matter.

"*Napoleon Mine.*—The 17,118 tons of sulphide flux shipped during the year were of better grade, both as to gold and sulphur contents, than for a number of years. Mining and tramway costs were reduced to an average of \$1.588 per ton. The ore shipped was offset by new ore developed, leaving the ore reserves unchanged. These reserves are sufficient to serve all needs for many years to come. The machinery, plant, and aerial tramway have been maintained in good condition.

"*Napoleon Mill.*—Through delays in receipt of machinery and by reason of further alterations found necessary in the mill, it was late in September before all the problems relating to the treatment of the ore were finally and successfully solved. The ore milled was 6,483 tons. On account of the increased expense of mining and milling oxide-ore in the winter season, when in the open quarry-work it becomes mixed with snow and freezes into masses not readily handled, it was decided to close the mill until the spring of 1913, after which a steady and successful season's run should be had.

"*The Queen Victoria Mine.*—This property is nine miles west of Nelson, B.C., and was purchased in November, 1912. The ore is an altered limestone, similar in self-fluxing properties to the Boundary ores, but carries a higher percentage of copper. The mine is equipped with an electric-driven compressor plant, and is connected with the Canadian Pacific Railway by an aerial tramway.

"The months of November and December were occupied mainly in getting the mine into general working shape, and in opening up new ground for stoping; 1,080 tons were shipped in December.

"*Smelter.*—The smelter ran steadily throughout the year, handling a larger tonnage than for any equal period in its history. During the first two and a half months, until a sufficient supply of coke was secured for the entire plant, only two furnaces were operated. The total tons smelted for the thirteen months of the fiscal year were 740,589, as compared with a total tonnage of 608,945 for the twelve months of the fiscal year of 1911. The sources of the ore smelted were:—

B.C. Copper Company's ores	443,022 tons.
Custom ores.....	284,575 "
Converter slags	12,992 "
Total.....	740,589 "

"The coke consumed was 103,154 tons.

"The converter slags included:—

B.C. Copper Company's ores	914 tons.
Custom ores.....	4,104 "
Clay	1,205 "
	6,223 "

“There were produced 11,259,140 lb. of blister-copper, containing:—

25,862.681 oz. of gold.
142,025.06 oz. of silver.
11,146,811.00 lb. of fine copper.

“No material additions were made to the plant during the year, the machinery as a whole being maintained in its normal condition.

“It is planned to use basic instead of acid linings for the converters should this be found practicable without material additions to the plant. Through decreased costs for clay and elimination of labour in refining converters, it is probable that a decided reduction in the cost of converting can be effected.

“*Prospecting Operations.*—During the year, twenty-three groups of mining claims in British Columbia and in the adjacent parts of the United States were examined by our engineers. This work resulted in the bonding of the Eureka Copper Mining Company's property, near Nelson, B.C., and of a group of mining claims on Copper mountain, near Princeton, B.C., known collectively as the *Princess* group. On these two properties exploration is being vigorously pushed by both hand-work and by diamond-drilling, with generally favourable results to date. Much exploration was also done in Voigt's Camp on Copper mountain with fairly successful results. The bond on this camp was allowed to lapse, but negotiations are now in progress for renewal. Amongst the groups examined are three others of much promise, which it is planned to explore during the coming season.

“*Operating Costs.*—The yield in copper, gold, and silver for the past year is less per ton than for any year in the history of the plant; the costs per ton for ore-handling, etc., are lower than for any year. On account of the low yield in the cost of producing copper per pound is 12.85 cents, notwithstanding the very low handling costs.

“The following table gives a comparison of the principal items for the past five years:—

	1908.	1909.	1910.	1911.	1912.
Yield of copper per ton of B.C. Copper Company's copper-bearing ores....	17.8 lb.	17.7 lb.	18.0 lb.	16.4 lb.	13.6 lb.
Yield of gold and silver per ton of B.C. Copper Company's ores.....	\$0.985	\$1.03	\$1.23	\$1.133	\$0.762
Average price realized for copper....	.13504	.1308	.12778	.1233	.16664
Costs of producing, refining, and marketing per pound of fine copper, after crediting expenditure with gold and silver contents of ores....	.09996	.09829	.09048	.11635	.12855
Costs per ton of handling ore, including all charges from ore in place to sale of the contained metals.....	\$2.632	\$2.683	\$2.730	\$2.882	\$2.4596

“Attached hereto are the official auditor's statements of accounts for the fiscal year, duly certified, comprising: Balance-sheet as at December 31st, 1912; Profit and Loss Account for the year ending December 31st, 1912.

“In concluding this report, the writer wishes to bear testimony to the uniformly loyal support and excellent work of all those in charge of the various departments of the company, whose collective work has enabled the company to attain the results set forth in the statement of the auditors.”

The *Old Ironsides*, *Knob Hill*, *Gold Drop*, etc., mines, owned and **Granby Mines**, operated by the Granby Consolidated Mining, Smelting, and Power Company, are for the most part situated in the Greenwood Mining Division, but as the head office and smelting-works of the company are located at Grand Forks, in the Grand Forks Mining Division, these properties have, for convenience, been described under that head.

Other Mines.—Little or nothing was done in 1912 by the Consolidated Company at its mines in the Boundary District—the *Phoenix Amalgamated* group and the *No. 7*. A small shipment of ore was made from the *Elkhorn*, near Greenwood, and tunnel-driving was continued on the *Argo*. The *Jewel* stamp-mill was operated during the last quarter of the year and some \$15,000 worth of precious metals recovered. Development of coal-measures in the Kettle River valley near Midway was continued. There was but little mining done in the country along the West fork of Kettle river, but now that a railway has been constructed to that part of the Boundary District several small high-grade mines there should be worked.

GREENWOOD MINING DIVISION.

REPORT OF W. R. DEWDNEY, GOLD COMMISSIONER.

I have the honour to submit the annual report on mining operations in the Greenwood Mining Division for the year 1912.

Oscar Lachmund, general manager of the British Columbia Copper **B.C. Copper Co.** Company, Limited, kindly furnished me with the following summary of the company's operations during the year:—

Ore Shipments.

<i>Mother Lode</i>	385,811 tons.
<i>Wellington</i>	9,714 "
<i>Emma</i>	4,729 "
<i>Rawhide</i>	261,953 "
<i>Athelstan</i>	44 "
<i>Jack Pot Fraction</i>	897 "

Ore Smelted.

Canadian	666,480 tons.
Foreign	32,865 "
	699,345 "

Metallic Content of Ores.

Gold	24,979 oz.
Silver	140,217 "
Copper	10,969,809 lb.

The ore treated at the Granby Consolidated Mining, Smelting, and Power Company's smelter at Grand Forks amounted to about 1,365,804 tons, and the total production of metals was valued at \$5,010,703. Most of the ore treated is shipped from mines situated in the Greenwood Mining Division.

The development at the company's Phoenix mines comprised: drifting, 5,444 feet; raising, 5,370 feet; and sinking, 256 feet; 12,698 feet of diamond-drilling was also accomplished.

PLACER-MINING.

Two locations were made on Rock creek during the year. I have no information that any gold was recovered.

Eleven placer-mining leases situated on the North and South forks of Rock creek were granted this year. Considerable work was done on W. C. Fry's lease on the North fork, and up-to-date machinery was used, but with not very good results.

COAL-MINING.

I am indebted to A. E. Watts, president of the Boundary Mining and Exploration Company's coal properties at Midway, B.C., for the following information concerning their development-work:—

“We have during the past few months employed ten to twelve men in driving a tunnel on a vein of coal which varies from 4 to 9 feet in thickness; the length of the tunnel is over 500 feet, although it has only gained a depth of 100 to 150 feet; the coal, being near the surface, contains considerable slate mixed with it. We are now making preparations to sink a slope on the vein for the purpose of demonstrating the area of the vein we are now developing. In addition to the two tunnels mentioned, we have also sunk a three-compartment shaft 7 x 16 feet in size and about 80 feet deep; this shaft is still in surface waste, but engineers estimate that we shall reach the coal-measures with this shaft at a depth of about 120 feet. This work has been done on Lots 422 and 637, which are owned in fee-simple by this company—that is to say, it is Crown-granted land—and all the workings are close beside the railway-track; consequently, we have good shipping facilities, while the close proximity to three smelters provides great markets.”

OFFICE STATISTICS—GREENWOOD MINING DIVISION.

Free miners' certificates.....	266
Locations..	108
Certificates of work	208
Filings	13
Transfers, agreements, etc.....	30
Certificates of improvement.....	8
Crown grants	12
Placer locations	2
Placer leases.	11

GRAND FORKS MINING DIVISION.

NOTES BY WM. FLEET ROBERTSON, PROVINCIAL MINERALOGIST.

Granby Consolidated.—The Granby Consolidated Mining, Smelting, and Power Company, Limited, in 1912 mined and smelted 1,250,689 tons of ore from its own mines in Phoenix camp. This compares with 606,000 tons in 1911 and 1,075,000 tons in 1910. It is claimed that as much new ore was developed during the company's last fiscal year as was shipped to its smelter, and that there is still in the mines between 6,000,000 and 7,000,000 tons of minable ore “estimated in sight.” Development-work in the company's mines was carried on as usual; the total for the year was rather more than 11,000 lineal feet of drifts, crosscuts, and raises. Diamond-drilling runs to about 1,000 feet a month when in full operation, and the cost of this is put down as adding to development costs about 14 cents, bringing mining costs up to about 78 cents a ton



Little Klappan River—looking down towards its Mouth.



Little Klappan River—looking up to Graveyard Camp.

of ore mined. Much of the drilling is done in new territory outside of the sphere of present mining operations, with the object of finding new ore-bodies. In the early summer of 1911 a map was prepared of an area to be systematically drilled, and the positions of drill-holes determined upon. Drilling has since been steadily prosecuted, the intention being to continue this work until the whole area has been explored.

At the company's big smelting-works at Grand Forks, an important change made was in the method of disposal of the slag—from hauling it out to the dump molten in trains of slag-pots, to granulating and elevating, by belt-conveyors, to a height of 100 feet, thus forming a new dump on top of the old one. The new system has been successfully developed, and late in 1912 a second set of trestles and belt-conveyors was put in for use in case of interruption of that used throughout the year. The smooth and successful working of the company's blast-furnace operations will be indicated by mention of the fact that all the eight furnaces were run continuously from June 5th to November 9th, a period of 156 days, this constituting a record run for the whole battery at the works. Apart from this, there was very little interruption to the running of the furnaces or the converting plant at any time throughout the year.

The official returns from the company for the calendar year 1912 show that there was mined and smelted 1,250,689 tons of ore, of which the "assay-value" contents was: Gold, 51,145 oz.; silver, 343,251 oz.; and copper, 31,156,708 lb.; while the contents actually "recovered" by the smelting operations was: Gold, 44,579 oz.; silver, 271,070 oz.; and copper, 22,409, 900 lb.

The company employed during the year a daily average of 482 men about the company's mines, of which 374 were employed "underground" or mining, and 108 were employed on the surface.

In his report for the company's fiscal year ended June 30th, 1912, the superintendent of the smelter included the following information: "Average smelting cost for the year was \$1.256, as against \$1.172 for 1911 and \$1.187 for 1910." (NOTE.—Tonmage of ore smelted was: To June 30th, 1912, 739,519 tons; 1911, 984,346 tons; 1910, 1,183,624 tons.) "The last five months, leaving out the months when high-priced (Pennsylvania) coke was used, show fairly well, being \$1.20. The ores were more siliceous this year than last, and slags were higher in silica. The copper loss was less than in any previous year. . . . Smelting and converting the last five months were \$1.264, being 0.024 cents less than 1911, and the lowest yearly costs the Granby Company has ever made. Average cost of smelting and converting was \$1.34, and loss of copper in slags was 4.2 lb." It should be remembered that labour troubles at the collieries caused a suspension of smelting for between four and five months in the latter part of 1911, so that several weeks of 1912 passed before conditions became normal.

The following extracts are from the annual report of the directors for the fiscal year ending June 30th, 1912:—

"TREASURER'S REPORT.

"Following is a summary of the year's business:—

"Produced.

" 13,231,121 lb. of copper fine, sold at average price of	\$ 0.1558
225,305 oz. of silver fine, sold at average price of	0.5906
33,932 oz. of gold fine, sold at average price of	20.00

The total amount realized equals. \$2,874,759 55

"Costs.

" Working expenses at mines and smelter, freight, refining, selling, and general expenses	\$2,128,211 03	
Foreign ore purchased.....	163,169 54	
		\$2,291,380 57
Cost per ton, including all expenses \$ 2 90		
15 cents per ton added account expenses of close-down.		
Cost per pound of copper after deducting value of gold and silver	0.111	
Net profit for year ending June 30th, 1912.....	\$ 583,378 98	
Surplus carried over from last year.....	2,533,304 97	
		\$3,116,683 95
Loss allowed for depreciation	600,562 39	
		\$2,516,121 56
Net surplus, June 30th, 1912.....		\$2,516,121 56
There has been expended on new construc- tion and equipment at the mine and smelter.....	\$48,266 92	
Mine development during the year....	6,365 lineal feet.	
Diamond-drill development	6,311 "	
Granby ore smelted	721,719 dry tons.	
Foreign ore smelted	17,800 "	
Plant was in operation.....	7 months, 24 days.	
Plant was closed down.....	4 " 6 "	

*" ASSETS AND LIABILITIES (JUNE 30TH, 1912).**"Assets.*

" Cost of lands, real estate, machinery, buildings, dwellings, and equipment, less depreciation allowed	\$15,081,005 34	
Stocks and bonds	519,332 85	
Hidden Creek Copper Company investment	979,461 19	
Fuel and store supplies	164,191 18	
Cash and copper.....	791,789 38	
		\$17,535,779 94

"Liabilities.

" Capital stock	\$15,000,000 00	
In the treasury	1,485 00	
		\$14,998,515 00
Issued shares.... 149,985.15 @ \$100.....		\$ 1,603 93
Dividends held for liquidator.....		19,539 45
Accounts payable		21,143 38
Surplus		2,516,121 56
		\$17,535,779 94

" G. W. WOOSTER, *Treasurer.*"

REPORT OF MINE SUPERINTENDENT.

“PHOENIX, B.C., July 1st, 1912.

“*Jay P. Graves,*
General Manager, Spokane, Washington.”

“DEAR SIR,—The following is a report on the mining operations in Phoenix during the past year:—

“*Shipments.*”

“Owing to the shut-down between August 12th and December 20th, 1911, the shipments show a falling-off from previous years. Altogether 723,024 tons were shipped.

“The following table shows the total shipments to date and their origin:—

Above No. 3 tunnel.....	4,731,637 tons
Victoria shaft.....	2,362,303 "
Gold Drop.....	881,254 "
Total.....	7,975,194 "

“*Development-work.*”

“This was not carried on during the close-down.

“Diamond-drilling for the year amounted to 6,311 feet, and the total to date is now 61,145 feet.

“The average cost per ton, including development, was 77.1 cents. During the last six months, the period during which the mine was steadily operated, the cost was 74.4 cents.

“*Recovery.*”

Copper	1.25 per cent.
Silver	0.29 oz.
Gold	0.043 "

“Between the unavoidable inclusion of a certain amount of waste in the ore as it leaves the mine and the losses at the smelter, the above recovery has been the best that could be obtained. In the future, unless some higher grade of ore is developed or better recoveries made at the smelter, we will be unable to make any improvement.

“*Ore in Sight.*”

“Ore estimates in the *Ironsides* mine are now calculated entirely from transverse vertical sections. These are taken every 100 feet. This is close enough so that no important irregularities in the ore-bodies are overlooked. Sections have been brought up to date, a tonnage estimate has been placed on all outlying ore-bodies not previously estimated, and the result shows a tonnage in the mine of 6,433,418 tons, as against 6,420,267 tons shown on last year’s report. The ‘ore in sight’ summary for July 1st, 1912, is shown in the following table:—

	Gold Drop.	Ironsides.	Total.
Ore developed.....	1,188,000	13,220,612	14,408,612
Mine has produced and shipped..	881,254	7,093,940	7,975,194
Remaining developed ore.....	306,746	6,126,672	6,433,418

“Respectfully submitted.

“C. M. CAMPBELL,
Assistant Superintendent.”

REPORT OF SMELTING SUPERINTENDENT.

"New Construction.

"During the past year we have changed our haulage of slag; where formerly we hauled and dumped the slag hot, we now granulate the slag, carrying it by water to bins centrally located, where it is dewatered and then conveyed up an incline 100 feet above present dump by conveyor-belts and stacked. The first cost of this installation was \$44,256.41.

"Blast-furnace Department.

"Last year, it will be remembered, we finished the year with Eastern coke, which cost \$10.55 per ton Grand Forks. This year we ran on Eastern coke during July and up until August 14th, when we closed down owing to excessive coke cost, and stayed closed until the coal strike was settled in the Crowsnest. We blew the furnaces in again December 21st, having been down four months and seven days. In July, August, and part of December and January coke was charged to us at Eastern prices, making costs heavy, while for the rest of the year we used Crow's Nest coke. This gives us an average of 7.09 furnaces operated for 237 operating days, or 4.58 furnaces for the full year.

"The Furnace Department smelted:—

Granby ore.....	721,719	tons.
Foreign ore	17,800	"
Converter slag and matte... ..	28,361	"
Flue-dust	4,422	"
Average per cent. of coke used per ton of ore.....	13.06	per cent.

"From tonnage standpoint, operations were bad; tonnage for the year being 739,519 tons ore, against 984,346 tons 1911 and 1,183,624 tons 1910.

"Average smelting cost for the year was \$1.256, as against \$1.172 of 1911 and \$1.187 for 1910. The last five months, leaving out the months when high-priced coke was used, show fairly well, being \$1.20. Everything in this department is in good repair and capable of being operated to full capacity, as is being done at this writing.

"The ores were more siliceous this year than last, and slags were higher in silica. The copper loss was less than any year previous.

"Converting Department.

"In this department we have very materially reduced our costs, so that the latter months show very well. July, August, December, and January are high on account of small tonnage, high-priced coke, and getting the basic process well under way. I can say that we are now well established in the practice and it is a success. Costs in this department were \$0.084 per ton ore. The last five months show 0.0637 per ton ore. This shows well when compared with last year's. We produced 13,226,360 lb. copper in 1912, as against 17,858,860 lb. in 1911. This department handled 19,500 tons of 33.9 per cent. matte.

"This department is in good repair and machines are in good shape. Operating only 237 days out of the year makes it look bad for tons smelted and pounds copper converted, and on account of high-priced coke, costs were high for three of these months. This has been partially offset by cleaner slags, better recoveries, and that the prevailing price of copper has been fairly high.

"Smelting and converting the last five months were \$1.264, being 0.024 cents less than 1911 and the best yearly costs Granby ever made. Average cost of smelting and converting was \$1.34, and loss of copper in slags was 4.2 lb.

"Everything was satisfactory in regard to the handling of material by the railroads.

"There was no difficulty with labour and plenty of men are offered for work.

"Respectfully submitted.

"W. A. WILLIAMS, *Superintendent.*"

The following report upon the company's operations at Granby bay, on Observatory inlet, in the Skeena Mining Division, will be of interest:—

“ANYOX, B.C., September 10th, 1912.

“*J. P. Graves, Esq.,*
General Manager, The Granby Consolidated Mining,
Smelting, and Power Company, Limited,
Spokane, Wash.

“DEAR SIR,—I beg to hand you the following report on the Hidden Creek Copper Company's mine at Anyox, B.C.:—

“Up to September 1st, 1912, the total amount of development-work accomplished has amounted to—

Cuts.....	2,255	feet.
Drifts	8,671	“
Raises	1,051	“
Diamond-drill.....	23,590.5	“
Total	35,567.5	“

“The greater part of the above work has been done above the 385-foot level, and has developed so far, in round numbers, 5,000,000 tons of ore which will carry 228,000,000 lb. of copper and 20 cents per ton gold and silver.

“It is not the object of this report to go into any detail regarding the nature of the ore-deposit, the natural advantages for mining and smelting at Anyox, the transportation facilities, etc., as all these points have been placed before you by others in former reports, far better than I could do it.

“The work for the past year has been carried on without serious accident; the men are well housed, healthy, and contented, and everything is in excellent shape to continue work economically during the winter months.

“*No. 1 Ore-body* is opening up remarkably well at depth, especially on the east side of the main tunnel 385-foot level. The diamond-drilling on the west side of the tunnel is showing up fully as well as could be expected considering results obtained previously in down holes between levels 530 and 385. At present we are driving hole No. 86, which starts in drift No. 10, level 530, and goes down at an angle of 45 degrees to the west. This hole has now reached below the 385-foot level and has an average value of over 3 per cent. copper.

“During the winter months I advise running drifts No. 10 and No. 20, 385-foot level, and crosscutting the ore-body every 100 feet by diamond-drill. The main tunnel should also be continued to ore-body No. 2.

“*No. 2 Ore-body.*—The work done in this ore-body has been extremely gratifying. Levels 530, 630, and 700 are all opening up ore in large quantities and of much better value than was anticipated.

“Hole No. 67, driven from 40 drift, 530 level, crosscuts the ore-body and at the same time goes down at a dip of 30 degrees, thus reaching the 385-foot level. The hole averaged 3.5 per cent. copper for a distance of 350 feet.

“I advise continuing work during the winter on all three of the above levels, but it is most essential to get tunnel 385 driven into this ore-body and get it connected with level 530 by a large raise, thus securing good ventilation.

"During the past few months we have done considerable work at the foot of Mammoth bluff by trenches and short tunnels. Evidently a large amount of the ore-body has been worn away in years past, so that at the present time there is an enormous quantity of broken ore deposited at the foot of the bluff. This ore is in boulders varying a good deal in size, but fairly well broken up. We have penetrated the mass of boulders in two places for over 60 feet and exposed them for a distance of over 300 feet. Samples have been taken in many places, and the assay returns indicate a grade of about 2 per cent. copper. We intend to clear the mountain-side of trees, and then wash away the soil and dirt and handle the boulders by means of steam-shovels. The ore standing in the bluff itself can be handled in the same way.

"During the coming winter I think we should spend in the neighbourhood of \$12,000 a month on mining. A less expenditure than this would not be in proportion to the necessary overhead charge. At present we are using three diamond-drills. I advise cutting this down to one drill, which will do about 1,000 feet of drilling per month. About \$2,000 of the above amount should be spent in preparing ore-pockets, etc., for shipping ore. The remainder should be spent on the different levels as recommended under the discussion of ore-body No. 1 and No. 2.

"*Sampling.*—The sampling of diamond-drill cores has been done in 5-foot sections by taking approximately every other inch of core in each section as an assay sample. The remaining core is marked and stored in a house prepared for that purpose.

"Drifts have been sampled by taking a powder-box of ore from each car as it leaves the mine. In this way a drift sample of 5 feet is composed of from sixteen to twenty powder-boxes of ore or about 350 lb.

"I am pleased with the way the property is looking, and I trust I have placed the situation before you in a satisfactory manner.

"Yours respectfully,

"O. B. SMITH,

Superintendent of Mines."

GRAND FORKS MINING DIVISION.

REPORT OF S. R. ALMOND, GOLD COMMISSIONER.

I have the honour to submit the annual report on mining in the Grand Forks Mining Division for the year 1912.

The output of ore in the Boundary District for 1912 overreached all previous records, and apparently will leave but little room for increase in the future unless more capacity is forthcoming for the handling, over 2,000,000 tons having been treated at the smelters, and, approximately, between 23,000,000 and 24,000,000 lb. of blister-copper produced from that tonnage.

The increase in the ore tonnage over the previous year was over 800,000 tons, and the increase, for the same period, of blister-copper was some 11,500,000 lb.

Work in the different camps, outside those where the Granby and British Columbia Copper Companies are working, has not been of more import than to keep the claims that have not been Crown-granted alive.

As L. B. Reynolds, in a review for the *Nelson Daily News*, covers the ground of the Granby Mining, Smelting, and Power Company, Limited, in that portion relating to the Boundary ore-output, I cannot do better than reproduce it here.

In that report Mr. Reynolds says:—

“The profits made by the Granby Company last year will total close Granby C.M.S. to \$1,250,000, after all deductions, such as depreciation, deficit caused by and P. Co. shut-down in 1911, etc., have been made. The gross working profit is stated to have been \$1,600,000, the actual cost of mining and smelter treatment by the company to have been \$2.38 a ton, and the cost of copper production 9.45 cents a pound. The cost in 1911 was given as \$2.90 a ton and 12½ cents a pound of copper. The costs of the company are depending greatly on the output, as tonnage decreased them very rapidly. Last year the enormous tonnage, 1,250,689 tons, treated, the largest in the company's history, has brought the cost down to the lowest yet obtained. The cost of a pound of copper is figured by deducting from the total costs the value of the silver and gold contained in the ores. The shipments of blister-copper were 22,650,024 lb., containing 44,579 oz. of gold and 271,070 oz. of silver.

“The high average price of copper has greatly increased the profits over those of last year, and although they are not as high as in 1906 and probably 1907, when copper was at its highest price, they are still very satisfactory. No dividends will be declared, however, as the company is building for the future, against that time when the ore reserves at the Phoenix mines will become exhausted, by the development and equipment of the Hidden Creek Mining Company's property on the Coast. It owns 80 per cent. of the stock of this company, which was purchased for \$400,000. All this year's and last year's profits will go to the erection of a smelter at Granby bay and development of more ore reserves in the mine. No more dividends will be paid till this plant is in operation, and then, with a favourable copper market, the payment of dividends may be looked for on a larger scale than heretofore.

“*Dividends paid.*—The dividends paid by the company to date are:—

1903	.....	\$ 133,630 30
1905	.....	339,991 00
1906	.....	1,620,000 00
1907	.....	1,315,000 00
1908	.....	540,000 00
1909	.....	270,000 00
1910	.....	248,481 00
Total	.....	\$4,027,111 30

“The output for the year was 1,263,331 tons, 214,000 tons of which came from the *Gold Drop* at Phoenix, and the rest, except for a few thousand tons of Customs ore, from the Granby mine at Phoenix.

“The development at the company's Phoenix mines last year comprised drifting and crosscutting 5,681 feet, raising 5,492 feet, and sinking 256 feet, making 11,429 feet of narrow work. Diamond-drill holes to the extent of 12,397 feet were also run during the year. As no changes have been made at the mines this year, the description of them as given in last year's annual review is reproduced below.

“The company operates what appears to be two distinct sets of ore-bodies. The oldest and largest of these are on the *Knob Hill* and *Old Ironsides* claims, while the latter is half a mile to the east on the *Gold Drop* and adjoining claims.

"The ground above the No. 1 tunnel was worked by open-cuts, steam-shovels being employed. After nearly 1,000,000 tons had been taken out a fire destroyed the crusher. It was rebuilt at No. 2, 100 feet lower, in such a way that the ore drops from it directly into the railroad-cars, or, if none are available, through to No. 3 tunnel. All ore below No. 3 tunnel is hoisted from the Victoria shaft, the levels below being the 200, 300, and 400. No. 2 tunnel and the Victoria shaft are served by the Canadian Pacific Railway, while No. 3 tunnel and the Victoria shaft are served by the Great Northern Railway.

"*Three Thousand Tons daily.*—There are really four distinct mines with separate crews, rolling-stock, bins, crushers, etc., the *Gold Drop* making the fourth. The idea of this is that, in case of any accident to any part of the mine or to either of the railroads, the output from three of the outlets can be kept up and the smelter assured of a steady supply. The average output is a trifle over 3,000 tons a day.

"*System of Mining.*—In the upper levels the ore-bodies had a pitch of 60 degrees, but in the lower workings seem to flatten off. They are in places so wide that the crosscuts crossing them are 600 feet long. In opening up a level parallel drifts about 75 feet apart are opened up on the strike. At about 45-foot intervals raises are carried up vertically for three rounds, when they are continued at 45 degrees. The first of these is carried through to the level above for ventilation. When No. 2 is up about 30 feet, stoping is started until the two are connected and the same process continued. In this way the stopes are left with a network of pillars. These pillars are then mined by starting above and putting in long holes, using a tripod and blasting out a funnel-shaped hole called a 'glory-hole.' This is widened out until the sides get too flat for the ore to run. Other raises then can be brought up from a parallel drift underneath and the process repeated. Sufficient pillars are always left to support the roof till all the ore is mined out. While mining the ore these pillars are drilled full of holes. When all the other ore is mined out but them, these holes are all shot together and the pillars brought down in this way.

"The ore from the stopes is never touched with a shovel and the only shovelling done is that required in running the drift and starting the raises.

"The rock is hard and practically the only timbering done is for the chutes. The ore is hauled in 10-ton steel cars by electric locomotives of 75 horse-power on a 3-foot gauge track with 30-lb rails, capable of handling 150 tons per hour at each of the outlets.

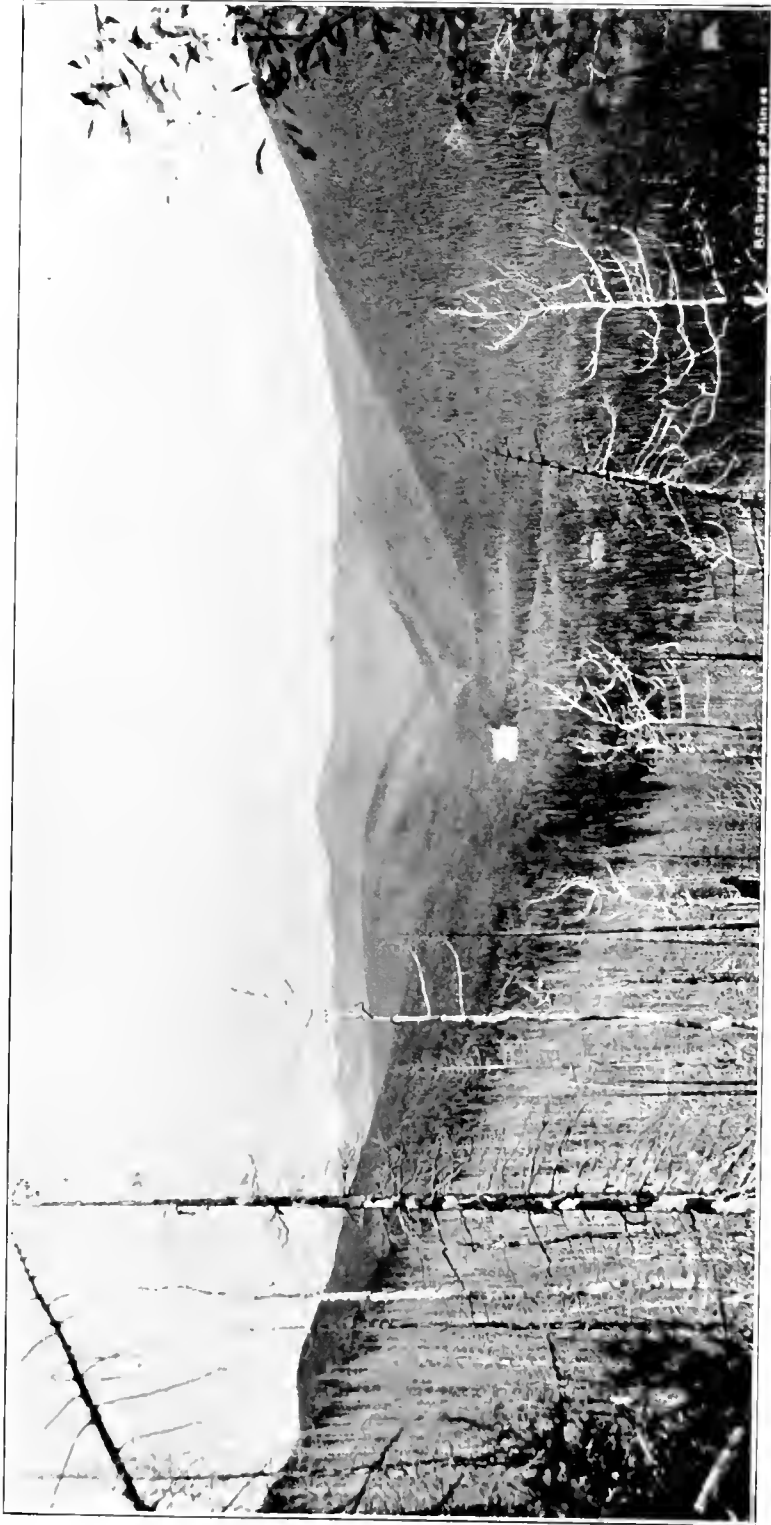
"All of the latter cars used in shaft-workings are wooden ones of 5 tons capacity, with a specially constructed side-dump that permits of their being dumped at the pocket while the train is running at full speed and causing no delay.

"In the *Gold Drop* all the ore is dropped through a 300-foot raise to the Curlew tunnel, where it is hauled to the crusher-bins, 800 feet distant, in the 3-ton capacity side-dump wooden cars by an electric locomotive.

"At the Victoria shaft the hoisting is done by a 250-horse-power electric hoist from three pockets, one for ore and one for waste on the 100, and one for ore in the 200. These are connected by raises with the upper level, which greatly increases their capacity.

"The shaft is of three compartments, having a 4 x 6-foot manway and two skipways each 5 x 6 feet in the clear. The skips are balanced and hold almost 5 tons, and 2,000 tons can be hoisted in eight hours.

"The skips dump 60 feet above the collar of the shaft into two bins of 500 tons capacity each. From these it passes through a 42 x 36-inch Blake crusher, driven by a 150-horse-power induction motor. From the crusher the ore is fed on a 250-foot conveyor-belt 42 inches wide.



Looking up the Skeena Valley from 4th Cabin of Yukon Telegraph Line.

travelling 250 feet a minute, with a capacity of 200 tons an hour. This delivers the ore to four bins of 700 tons capacity. Two of these are served by the Canadian Pacific Railway and two by the Great Northern Railway. Nine hundred tons can be loaded into the cars an hour.

“Compressed air is supplied by two 60-drill Rand compressors, run by a 700-horse-power motor.

“*Largest Smelter in Empire.*—The smelter is the largest in the British Empire and the second largest in the world. The only important change to be made was the installation of an additional unit of the slag-disposal system and the connecting-up of all the furnaces to the system. This additional unit was put in to take care of the slag while moving or repairing the other one, thus avoiding any possibility of the necessity of closing down the furnaces in case of accident.

“*Tremendously Improved Conditions.*—A comparison of the methods of 1902 and those of to-day show that at the *Ironsides* 280 men then mined 1,000 tons a day, while at present 387 men turn out over 3,000 tons a day. The costs are stated to be \$4.77 in 1901 and \$2.50 in 1910 a ton of ore mined and smelted.

“The ore is hauled by the railroads to the smelter, twenty-four miles distant, in 53-ton steel cars. These cars discharge into three sets of parallel ore-bins 760 feet long, of 5,000 tons capacity each. One in ten cars is put through a sample mill, and the ore is found to run so steady in value that 20 cents is the greatest variation in 30,000-ton lots noted.

“From these bins the ore is drawn with coke into charge cars run by electric motors of 30 horse-power, each train carrying 4 tons a load and handling 750 to 900 tons in twenty-four hours. There are four of these trains feeding the eight furnaces, which have a total capacity of from 3,000 to 3,400 tons a day when all are in operation. The cars run right into the furnace from the end and dump on both sides at once. The slag, heretofore, was hauled away in cars.

“During the first three years' operations at the plant the system of granulation was adopted, but, owing to the loose slag taking up so much room and running into the Kettle river, was abandoned and the slag was taken from the settlers at the furnace in a molten condition. Since that time it has been allowed to run into huge pots, containing 6 tons each, which were hauled by donkey-engines to the dump, and while still in molten condition was dumped.

“By dumping the slag hot the Granby has secured a yard over a mile in length and varying in width from 100 to 500 feet, and as the haul from the works to the dump has become so long and making this method so expensive, the company last year decided to again adopt the granulation system, only using a much more improved method of handling the slag.

“The new system, which was given its initial trial run in January, can now be said to have passed the experimental stage, although since the commencement of operations several minor difficulties have had to be surmounted.

“*Slag Granulated.*—The slag is allowed to run from the settlers, which are located at the outlet of the furnace, into flues where a steady stream of cold water granulates it and carries it down a main flume or launder to a series of bins, where it is dewatered. These bins are located several feet below the level of the present dump. After a bin has been filled, the stream of water carrying the slag is turned into another bin by means of gates in the main flume. A chute at the bottom of the bin already filled with slag is then opened and it is allowed to run on to an endless belt. This belt, which is 24 inches wide and $\frac{1}{2}$ inch in thickness, is carried on an incline trestle 500 feet long to an elevation of 120 feet above the

present dump or level of the furnace outlet. At the higher level of this incline trestle is located a cross-angle trestle 400 feet in length and equipped similarly to the main trestle. The main belt is driven by a 75-horse-power motor, as is also the cross-angle belt, but it is the intention of the company to first fill up the space between the present dump and the incline trestle before placing the second unit in commission. Upon the upper side of the trestle on which the belt runs when carrying its load are located steel rollers 6 feet apart. These rollers are cone-shaped, making the upper side of the belt concave, thus enabling it to carry a full load of slag without spilling. The slag can be dumped at any point along the trestle by means of a travelling hopper, through which the belt passes. This hopper cleans the belt of all slag by means of brushes, and allows it to settle to the present dump.

"The trestles at present constructed are only the first units in a series, which in the course of time will carry the slag to all parts of the dump, the present incline conveyor being used as a means of elevating the slag. It is officially stated that with the new system the Granby will have dumping-room for the waste material from 5,000,000 tons of ore, which means that the question of the disposal of the slag from their eight furnaces will not require any attention on the part of the company for the next five years.

"The installation of one unit of the new system cost the Granby in the neighbourhood of \$80,000, but it will mean a large saving to the company in the cost of treating their low-grade ores, doing away, as it will, with a miniature railway system and a large army of employees now necessary to carry on the work.

"The equipment for the new system was built by the Stephens-Adamson Company, and the success with which it meets with the requirements of the Granby is being watched with considerable interest by a number of smelting concerns, as the idea in connection with smelting operations is something entirely new."

OFFICE STATISTICS—GRAND FORKS MINING DIVISION.

Locations.....	67
Certificates of work.....	154
Transfers.....	25
Notices of work.....	22
Certificates of improvements.....	17

OSOYOOS MINING DIVISION.

REPORT OF RONALD HEWAT, MINING RECORDER, FAIRVIEW, B.C.

I have the honour to submit herewith the annual report of the mining operations in the Osoyoos Mining Division for the year 1912.

The mining operations in this district during the past year have been confined chiefly to Hedley and Kruger mountain. The mining operations in Camp Hedley are as follows:—

CAMP HEDLEY.

The year 1912 was in many respects a most notable one for Camp Nickel Plate. Hedley, and while, as before, the record of achievement is practically confined to the one producing group, yet there were important features connected with the year's work which were of far greater significance in outlining the future

of the other properties in the camp than ever before. As for the producing group, the *Nickel Plate* group, owned by the Hedley Gold Mining Company, it was both a record year and a year of smashing records all along the line. Those results put in the fewest possible words were: higher dividends to shareholders than ever before, the total for the year being 30 per cent. on the capital outstanding; the tonnage of ore mined and milled was greater; the amount of bullion produced was greater; the mill accomplished a higher duty per stamp; the extraction was higher; and, more important than all of them, the development done showed up a larger ore reserve than ever before. Every foot of development done during the year on the *Nickel Plate* itself was in ore.

Ore Tonnage.—The tonnage for the year is thus summarized in the company's annual report to shareholders:—

Date.	Tons milled.	Assay Value.	Recovery at Mill.	Expenditure.	Profits.
January	5,701	\$10 70	\$56,298 64	\$29,669 72	\$26,628 92
February	5,010	9 49	45,513 84	27,431 75	18,082 09
March	6,263	11 60	70,077 84	30,712 89	39,364 95
April	5,326	10 55	54,683 93	29,427 62	25,256 31
May	5,636	10 64	57,778 52	26,711 00	31,067 52
June	6,027	10 13	58,200 96	28,042 22	30,158 74
July	6,110	9 97	58,750 33	27,801 91	30,948 42
August	5,900	12 11	66,720 19	28,627 97	38,092 22
September	6,108	16 38	96,055 85	31,054 73	65,001 12
October	6,101	11 69	66,637 58	28,399 43	38,238 10
November	6,003	11 57	64,487 36	35,651 20	28,833 16
December	6,270	9 07	52,928 10	38,719 65	14,208 45
Totals.....	70,455 Av.	\$11 19	\$748,133 14	\$362,253 14	*\$385,880 00

*Including \$9,834.69 interest earned on funds of this company during 1912.

Mine Development.—The development for the year underground and on the surface is dealt with in the report of the general superintendent, who deals also with the *Windfall* purchase and improvements in the plant:—

“HEDLEY, B.C., January 1st, 1913.

“*To the President and Stockholders,*
Hedley Gold Mining Company:

“GENTLEMEN,—For the year 1912 your mill has treated 70,455 tons of ore, having an average value of \$11.19 to the ton, or a total value of \$788,715.05.

“The gold won is \$748,133.14 (an extraction of 95 per cent.). The profits were as shown on the treasurer's statement.

“Owing to the increase in tonnage, which used practically all the power available, we have been able to do but little development-work on the company's properties, excepting the *Nickel Plate*, where stoping and development-work in the ore-body has been carried on between the No. 3 and No. 4 tunnel levels, and the ore won has proven to be of a higher grade than estimated last year.

“The usual reserve tonnage of 10,000 tons of broken ore has been maintained.

“Mining below the No. 4 tunnel level has been very satisfactory and has proven that the ore-body, as indicated last year by diamond-drill, is a valuable addition to the reserves. An incline shaft (No. 5) has been sunk on the ore for 420 feet, three levels opened, and a fourth

started. Drifting and sinking proves this ore to be about 16 feet between walls and of an average value of \$14 per ton. At the collar of the incline the length of the ore-chute is 130 feet, at the 100-foot level it has been drifted on for 180 feet, and on No. 3 level for 80 feet; these drifts are in good ore all the way, and, together with the bottom of the incline, all the faces are in ore. This incline is in good shape to ship from, with ore-pockets in each level and plenty of good ground for stoping.

“A section of the ground under the *Nickel Plate* ore-beds has been proven by diamond-drill; also a section of the company's property lying to the north; but, owing to delayed negotiations for an option on the *Windfall* group of mining claims, which adjoins the *Iron Duke* (one of the company's original claims), we did not start drilling on this ground until July. By October seven holes were put down, three of which showed good values. The last two holes were discontinued before they entered the ‘ore zone’ owing to the severe cold weather freezing the long water-pipe lines. These holes would have aided considerably in making an estimate of the reserve tonnage; however, we have no hesitation in stating that the minimum quantity of reserve ore, as shown by development and diamond-drill, available in the *Nickel Plate* and *Iron Duke* claims, is 413,000 tons, and that this ore will average at least \$11.35 per ton.

“While the ground mentioned above was being tested, an option was held for the purchase of the *Windfall* group, comprising five claims, i.e., *Windfall*, *Morning*, *Winchester Fractional*, *Big Horn*, and *Czar*, which property adjoins the *Iron Duke*, and on October 30th the purchase of these properties was consummated. The terms of the option would not allow time to prospect the ground, as it would be necessary to drill each hole 500 feet, at least, before striking the ore-bearing sedimentary beds; but from indications in the hole drilled nearest the option property and the high values in the remainder of the holes, we consider these claims valuable.

“To mine the new ore-bodies, as well as the other ore-bodies below the No. 4 tunnel level in the *Nickel Plate* mine, we have received instructions to sink and have started another incline shaft, to be known as the ‘Dickson incline.’

“The intention is to sink this to 3,000 feet in depth. It is located so as to be under all the known ore-bodies, will have payable ore above it continuously for 1,100 feet, and the probability is that this will be extended next year.

“The *Sunnyside No. 4* incline has been extended 160 feet and is in promising country. Development-work in the *Silverplate* showed up some good ore, but it is apparently cut off by a large diorite-dyke. Both these properties are in a good formation with favourable conditions.

“The cost per ton for mining and milling for the year has been reduced 53 cents and the total cost 73 cents, although we have been paying a higher rate of wages, and the following additions, improvements, etc., have all been charged to ‘operating expenses,’ i.e.: Removing the old and installing the new 150-horse-power boiler (together with cost of new boiler); new diamond-drill; new hoist; improvements to the flume; rearranging the machinery on the tramway; general improvements at the mill; together with all mine development.

“Your mill has been kept in first-class repair and is doing good work; the water-flume is also in better shape than last year; changes have been made on the tramway, so that its operation is more satisfactory.

“Altogether we consider the past year most prosperous, and expect to see the ore reserves increase during 1913.

"Development—

Mine, <i>Nickel Plate</i> —Sinking.....	420 feet.
" " Drifting.....	510 "
" " Raising.....	110 "
" <i>Silverplate</i> . — Drifting.....	140 "
" <i>Sunnyside No. 4</i> .—Sinking.....	160 "
Total.....	1,340 "
Diamond-drilling ..	6,380 "

"Respectfully submitted.

"GOMER P. JONES,
General Superintendent."

Dividends and Profits.—The amount disbursed during the year was \$360,000, which amounted to 30 per cent. on the outstanding capital stock. As will be seen from the report of tonnage, the profits for the year were \$385,880, which left a margin to carry to surplus, and as the undivided profits at the beginning of the year were \$200,961.34, it will be seen that this surplus was added to in 1912, and is now at the beginning of 1913 \$226,841.34.

The Windfall Purchase.—This was really the most important and significant event of the year for the camp. Its importance lies in the fact that it proves the fallacy of the contention urged by former managers that the *Nickel Plate* deposit did not extend beyond the bounds of the *Nickel Plate* claim, and that the monzonite core of which Climax bluff is composed does not necessarily cut off the ore-body which has already given such important results in the production of about \$4,600,000 in gold bullion up to the end of 1912.

OTHER PROPERTIES.

In the early part of the year the litigation between the owners and the Redeemable Investment Company, which was believed to have hindered development-work, had been cleared away sufficiently to permit work being done, and it was carried on during the winter with a small force of men under the direction of A. Creelman. Something over 40 feet of sinking was done and the work closely sampled, and excellent results were obtained, which demonstrated the error which had been made in previous development in straying away from the ore-body instead of holding tenaciously to the pay-streak, no matter where it might lead. The funds available for work, however, appear to have been trivial, and as the payments to the owners were not kept up, the latter gave notice to the public that the deal was off and the property had reverted to them.

The affairs of this property, which have been in more or less confusion for several years past, received another twist or two to add to the general tangle when Charles H. Brookes obtained an option from some source or other, although no one seems to know where the authority came from, to give the option, as the property was covered with judgments for former debts contracted. At all events, an option which had been variously described as an option and a sale outright took place, and a new company called the Gold Plate Mines Company was formed. This concern provided several thousand dollars to develop the property, and the direction of the work was left to Mr. Brookes, who was very rarely on the property, and who saw fit to have nearly all the money that was spent put into surface work, and when the money was spent and more debts contracted, for which there was no more money left to pay, not a whit more was known as to the value of the property than when they began. Further claims and judgments were filed against the group and another chapter added to the folly of amateurism in mining.

The Oregon Group. This group, situated on the watershed between Sixteen-mile and Eighteen-mile creeks, had considerable development-work done during the early part of the year and encouraging results were obtained. There is a strong probability that more will be done during 1913.

The Apex Group. This group of claims, situated on Independence mountain, about six miles east of the *Nickel Plate*, saw much development during the year under a bond from the owners, who reside in New York. The parties who held the bond were T. D. Pickard, L. W. Shattford, M.L.A., and M. K. Rodgers. Most, or all, of the work was done by contract, and it comprised something over 200 feet of driving, besides other work. Mr. Pickard supervised the work on occasional trips from Vancouver, but the bond was allowed to lapse about the end of the year after something over \$5,000 had been expended in exploratory work. The high price which the bond called for was said to be a determining factor in causing the holders to let it drop.

Apart from the foregoing, nothing was done on the other claims in the camp except the annual assessments, and, as many of the claims have been Crown-granted, only a limited amount of annual assessment-work is required.

In regard to amount of development-work done by the Dividend-Lake View Consolidated Gold Mining Company on its properties on Kruger mountain, I have the pleasure to report as follows:—

Since August 1st, 1912, it has expended \$13,500 for machinery and its installation, wagon-roads, and mining and operating expenses. In brief, the amount distributed is as follows:—

40-horse-power engine and compressor with machine-drills.....	\$3,800 00
Installation, buildings for machinery, etc.....	700 00
Wagon-roads.....	500 00
Mining and operating expenses.....	8,500 00
Total.....	\$13,500 00

Lake View Property. In the latter part of November the company shipped two cars of ore from the dump, that had been taken out in development; this was only a small part of the dump, and was shipped to the smelter to find by actual test what was the value of the ore. The actual value of this ore was a little better than \$8 a ton, about equally divided between gold and copper.

Dividend Property. The company began stoping on this property by the "glory-hole" system early in December, and has shipped eight cars of ore to the Granby smelter at Grand Forks, B.C. This ore carried gross values of about \$15 a ton, and the commercial value, as yet, is all in gold.

The present size of the glory-hole is about 20 feet long east and west by 15 feet wide north and south, and has an average depth at this time of about 20 feet.

The company closed down on January 15th on account of the extremely unfavourable weather conditions, and just before closing down it encountered some very fine ore which assayed \$40 a ton in gold.

The company will resume mining operations as soon as the frost is out of the ground in the spring and the roads settled.

The ore is hauled to Oroville, Wash., a station on the Great Northern Railway, and is shipped from there to the Granby smelter. The hauling is done with a 5-ton auto-truck. After the company has done a little more road-work in the spring it intends to attach a 10-ton trailer to the truck ; it then expects to average one car a day for shipment.

PLACER DEVELOPMENT.

In addition to what is being done here in lode-mining, there has been an attempt to revive interest in placer-mining in the bed of the Similkameen river. J. D. McDonald, of Vancouver, who is reputed to be acting in behalf of English and American investors who are interested in gold-dredges elsewhere, did considerable panning in the bed of the stream, and considerable river-bed and bench ground was staked for placer-mining. The pannings were reported to have been very encouraging. The ground staked by these parties covers several miles up and down the river on both sides of the International Boundary, and at Chopaka they had a Keystone drill at work for several weeks. Another man named Corwin also staked several miles of the river in the vicinity of Ashnola creek for Edward Mahon, of Vancouver.

OFFICE STATISTICS—OSOYOOS MINING DIVISION.

Locations records.....	45
Certificates of work	113
Free miners' certificates	126
Certificates of improvements.....	7
Conveyances	11
Placer-mining leases.....	3

VERNON MINING DIVISION.

REPORT OF L. NORRIS, GOLD COMMISSIONER.

I have the honour to submit my annual report on mining operations in the Vernon Mining Division for the year ending December 31st, 1912.

The mining situation in this district remains practically unchanged since my report of last year.

OFFICE STATISTICS—VERNON MINING DIVISION.

Free miners' certificates	183
Mineral claims	45
Placer claims.....	2
Certificates of work	23
Conveyances	2
Coal licences (renewals).....	6

YALE DISTRICT.

KAMLOOPS MINING DIVISION.

REPORT OF E. T. W. PEARSE, GOLD COMMISSIONER.

I have the honour to submit the annual report on the Kamloops Mining Division for the year ending December 31st, 1912.

In the Kamloops Mining Division nothing fresh has developed. Assessment has been faithfully kept up and several Crown grants have been applied for, but money does not seem to be forthcoming to introduce the smelting facilities which are so badly required.

Several reports of the different camps should have been appended hereto, but for some unaccountable reason they have been withheld so long that I cannot further delay this report by waiting for them.

A slight excitement was caused during the autumn by the discovery of placer gold on Louis creek. Only a few months' work was done on the claims and a regular clean-up was not made on any of them, so that I cannot give results, except in a general way to state that the claim-holders were every one of them satisfied with the prospects. The whole creek from the surface down seems to be impregnated with gold, which, however, is of so fine a nature that considerable difficulty will be experienced to make sure that the whole return has been secured. I have strongly advised all claim-holders to save the black sand, a sample of which was sent for assay by one of them; the result of this, as I say, is not known to me. One lease was staked on Dixon creek and the initial work on this produced a very satisfactory result; the owner, after removing a few boulders, took out a pocket containing about $\frac{3}{4}$ oz. of rather coarse gold, many pieces of which would be worth from 25 to 30 cents.

Coal-mining operations seemed to have been suspended entirely this season for some reason unknown to me.

SEYMOUR ARM CAMP.

Hugh Sinclair writes me as follows:—

"In reply to your request for a report on our claims in Seymour arm, I might say that we have done the usual assessment and have proved the continuity of the copper vein the full length of our four claims, the vein-matter being 300 feet wide at the end of the *Copper King*, and apparently that width throughout, but we have not yet done enough work to exactly prove it. The ore is of the same grade throughout.

"I might say that this vein continues through McLeod & Co.'s four claims and into Bass and his partners' claim, beyond McLeod's, making a total length of 13,500 feet of good-grade copper-ore. Where we found it to be 300 feet wide is where we join McLeod's claims."

OFFICE STATISTICS—KAMLOOPS MINING DIVISION.

Free miners' certificates.....	148
Certificates of work.....	115
Records (mineral).....	119
" (placer).....	44
Bills of sale.....	18
Certificates of improvement.....	7
Total receipts.....	83,282 40

 ASHCROFT MINING DIVISION.

REPORT OF H. P. CHRISTIE, MINING RECORDER.

I have the honour to submit the annual mining report and office statistics for the Ashcroft Division during the year 1912.

The situation generally remains unchanged, although there has been for some months more than the usual activity in Highland valley, and it is expected there will be some extensive development-work done during the coming year.

Highland valley is situated about twenty-seven miles south-east of Ashcroft, approximately half-way between Ashcroft and Nicola, on the height of land forming the watershed, and is accessible at the present time only by the wagon-road between these two towns, which runs through the camp.

In 1907 the Provincial Mineralogist examined a number of properties in this camp, the notes of his inspection appearing in the Report for that year on pages 134 *et seq.*, from which it would appear that several of the claims in the camp contained copper-ore of workable grade, with a little gold and silver.

Since that time work has been carried on each year, to a small extent, on most of the claims, sufficient to cover the annual assessment requirements; the lack of transportation facilities, however, would prevent any shipment of ore, as the ore is not of high enough value to stand wagon-haulage to the railway, while the development of the camp is not as yet sufficient to justify any plans for a railway.

There is enough ore showing on several of the claims to induce their further development and to stimulate more extended prospecting in the locality.

The gypsum-deposits, located on the bank of the Thompson river opposite the Canadian Pacific Railway station at Spatsum, a few miles west of Ashcroft, have been acquired by a strong company with headquarters in Vancouver, and it is understood that, in the near future, steps will be taken to ensure the utilization of the mineral which seems to occur here in large quantity and of unusual purity, although the development necessary to prove these points is sadly lacking, the present owners seeming content at having tied up the property. The location of the deposit on a hill rising up from the river-bank is such as to permit of very simple and cheap transportation of the mineral by aerial tramway directly from the deposit to across the river on to land adjacent to the Canadian Pacific Railway tracks.

OFFICE STATISTICS—ASHCROFT MINING DIVISION.

New locations recorded	112
Certificates of work recorded	57
Conveyances recorded	15
Free miners' certificates	96

YALE MINING DIVISION.

REPORT OF L. A. DODD, MINING RECORDER.

I have the honour to submit herewith the annual report and statistics for the year ending December 31st, 1912.

PLACER-MINING.

Little or no general work has been done in this class of mining.

The Siwash Creek Mines, Limited, has been working steadily on its group of creek leases, and will, within a month, be in a position to know whether the large expenditure will bring its reward or not. The following is contributed by the managing director of the company:—

“I may say that during the year 1912, with a crew of about twelve men, we have steadily prosecuted the plan originally laid down for the development of our property. Beginning at a point above the falls upon the lower lease, we ran an open rock-cut and tunnel of capacious size for about 450 feet, and at a depth of about 35 feet below the gravel surface we are now entering into the bed of the channel of the creek above. This must shortly bring us into contact with the bed-rock of the original channel, and as there are abundant indications of the richness of this basin, we expect to secure rich returns. Besides the free gold in these gravels, there are large deposits of black sand carrying gold and platinum values in combination.”

A. W. McLelan, who has a bar lease near Keefers, had three or four men at work for a considerable period, but I have no report of the result obtained.

Considerable prospecting was done on Hills Bar creek by Wm. Livingstone, Alexander Munro, and others. Indications were sufficiently inviting for Messrs. Livingstone and Munro to take up half-mile leases, which they intend working the coming season.

Three leases were granted on the North fork of Siwash creek and three on the South fork. Those on the South fork are a continuation of the original property of the Siwash Creek Mines, Limited, and have been acquired by the company.

Seven creek leases were also granted on Little Emory creek; the development of these seems to depend on the result obtained at Siwash creek, as a number of the same people are interested.

A bar lease covering Boston bar was granted to Robt. Hamilton, of Vancouver, but I have not heard of any development having been done.

Five dredging leases covering $22\frac{1}{2}$ miles of the bed of the Fraser river were granted during the year. A dredge is being built at New Westminster to work the lease granted to Finlay McIntosh covering the five miles west from the mouth of the Coquihalla river. This dredge is a combination shovel and dipper and has not heretofore been tried on the Fraser; I am informed that this pattern of dredge has worked very successfully in the Yukon.

Messrs. Boek, Templin, and Wood, of Seattle, have five miles of the bed of the Fraser east from the mouth of the Coquihalla and have made a considerable expenditure: they have installed a plant on a new plan in the bed of the river below Strawberry island, consisting of a Weeks two-line scraper-dredge of 1-yard capacity, which digs under water by the control of these two lines, which are operated from a donkey-engine on shore: one line hauls the scraper out into the river and the other brings the load ashore, where the material is dumped into a hopper and fed into sluice-boxes for separation. They have not yet begun

operations, hence the results from this plan are still to be determined, but, as the scraper has been proven a success in sand and gravel digging, it is hoped that it will give satisfaction here. If the plan is a success, other similar plants will be installed on the ground covered by the lease, and also on the five miles between Five-mile creek and Spuzzum creek, which is controlled by the same parties.

The Hills Bar Gold Dredging Company, Limited, started in last spring to build a dredge. They built the seow on the river-bank here, but the machinery has not yet been placed in it: a dredge of the caisson type is proposed. Their lease covers some of the most promising dredging-ground on the river, for it was on Hills, and other neighbouring bars, that such rich returns were had in early days.

The fifth dredging lease is for two and a half miles west from North Bend, and was granted to Robt. Hamilton at the same time as his bar lease. It is the intention to work the two leases in conjunction.

QUARTZ-MINING.

The Mining Division is still suffering from the evil effects of the Steamboat Mountain fiasco, and it is therefore hard to interest capital in the promising prospects in other parts, the whole Division being more or less judged by a small part. Assessment-work on the most promising prospects has been done and quite a number of new locations made, but beyond that little has been accomplished.

Chas. Camsell deals very fully with the Skagit Valley area in the Summary Report of the Canadian Geological Survey for 1911, commencing at page 115.

Of the *Jumbo* group, situated on Silver creek near Hope, Mr. Camsell says, on page 111 :—

“A group of three mining claims known as the *Jumbo* group is situated on the west side of Silver creek, about four miles south-west of Hope. The claims lie in a steep narrow gorge at an elevation of about 1,100 feet above the sea. The country-rock is massive grano-diorite, in places sheared and traversed by fissures. The ore-deposits lie in the fissure-veins and have a width averaging about 8 inches. They contain dull-coloured arsenopyrite and a little chalcopyrite in a gangue of quartz, and carrying gold as the principal valuable metal. The value of the ore in the fissures ranges from \$10 to \$60 to the ton. The claims are developed by three tunnels of varying length and several ‘open-cuts.’ These claims and adjoining locations are now owned by the Aufcas Gold Mines, Limited, which has recently made successful arrangements for financing the development of the property. The company intends building a wagon-road from the Interprovincial highway at the mouth of Wardle creek to the camp, and proceeding with the construction of permanent camp buildings, including cook-house, bunk-houses, storehouses for supplies and tools, the laying of pipes to supply the camps with water, and the clearing of the right-of-way for an aerial tram. As soon as the road and camp are ready for use, work on the lower tunnel will begin and will continue until the vein is struck.”

With reference to the Siwash Creek area, I can do no better than quote from the summary and conclusions arrived at by A. M. Bateman, a member of Mr. Camsell's party. This area practically includes the district between Siwash creek and Spuzzum on the east bank of the Fraser. Mr. Bateman says, on page 125 of the report :—

“The rocks underlying the area consist of a metamorphosed sedimentary series represented by slates, garnet-schists, mica-schists, siliceous-schists, quartzites, and thin bands of crystalline limestone. This series is intruded by the Coast Range granitic batholith and its accompanying acid and basic dykes. A small remnant of volcanic tuff overlying the granitic rock is exposed

in one locality. Glacial deposits are found along the borders of the stream. The gold, without exception, is associated with porphyry-dykes, and occurs in the porphyry itself, or in quartz veins alone, or adjoining the contact of the porphyry with slate. The gold is thus seen to be genetically dependent on the dykes, and the great number and wide distribution of these dykes makes it a promising field for prospecting. Some of the gold-deposits have rich surface showings, but are usually 'pockety,' and the gold appears to have undergone considerable surface enrichment. Large superficial areas may contain a sufficient number of rich stringers and pockets to be worked commercially, while the others would only justify inexpensive mining methods."

Considerable development-work has been done since the visit of the Geological Survey party, especially on the Mt. Baker & Yale Mining Company's group of Crown-granted mineral claims, and on a number of the Hidden Creek and Anderson River locations. Great confidence is expressed by the owners of the claims in this area, and with the early completion of the Canadian Northern Railway, they will be in a position for economical development.

OFFICE STATISTICS—YALE MINING DIVISION.

Free miners' certificates issued.....	183
Locations recorded.....	121
Leases granted.....	20
Bills of sale, powers of attorney, options, etc., recorded.....	56
Certificates of work issued.....	132
Filings.....	17

Revenue.

Free miners' certificates.....	\$ 1,158 75
Mining receipts.....	3,476 55
Other sources.....	13,471 50
Total.....	\$18,106 80

NICOLA MINING DIVISION.

REPORT OF W. N. ROLFE, MINING RECORDER.

I have the honour to submit herewith the annual report and statistics of the Nicola Mining Division for the year ending December 31st, 1912.

With regard to the metalliferous mines of the district, the necessary assessment-work has been well kept up, as holders of mineral claims are imbued with the hope that the very near future will see railway facilities provided, thereby enabling ore shipments to be made for treatment at the smelters, which is impossible under existing circumstances, except at prohibitive rates.

In the vicinity of Merritt, the Inland Coal and Coke Company, Limited, has been working steadily in developing the property, with very gratifying results. While several new seams of coal have been exposed, the work has been almost entirely confined to opening up and blocking out a large reserve on the No. 3, and this work has, as was confidently anticipated, demonstrated the continuity of the seam, which is capped with a remarkable sandstone formation. Much satisfaction is expressed that the excellent quality of the coal is maintained in the new workings, as also at the noticeable freedom from deleterious gases.

After a considerable period of delay and expense, railway connection with the property was obtained during the latter part of August, since when the output has been constantly increasing. The intention is announced, however, of vigorously pursuing a policy of development on the No. 3, as also to open up the No. 5 seam: then, with the aid of additional machinery and plant, the management is sanguine that the output will be largely expanded. The total output of coal mined during the year has exceeded 30,000 tons, the bulk of this going to the Canadian Pacific Railway Company.

The operating of the property at night has been greatly facilitated during the year by the installation of an electric-lighting plant.

Nicola Valley Coal and Coke Company, Limited.—The operations conducted for winning coal at this property resulted in an output of 142,973 tons (2,240 lb.) during 1912, which is less than that of the previous year. No additional plant has been installed, and development in the way of new work has been restricted to the opening-up of a new 5-foot seam, situated above the No. 4, and known as No. 6, but no coal from this seam, so far, has been brought to the surface.*

OFFICE STATISTICS—NICOLA MINING DIVISION.

Locations recorded.	57
Free miners' certificates issued	80
" " " (special)	1
Certificates of work	80
Certificates of improvement . . . . .	..
Bills of sale.	4

* Further details of coal-mines in this district will be found under the heading of "Coal."

SIMILKAMEEN MINING DIVISION.

NOTES BY PROVINCIAL MINERALOGIST.

Voigt's Camp.—The British Columbia Copper Company did much development-work on two groups of mineral claims, held under option of purchase, situated about ten miles south of Princeton. The larger group, known as *Voigt's*, contains fifty-five claims; the smaller includes eight claims having individual owners. Development-work was commenced in October, 1911, and carried on continuously until December, 1912. Six diamond-drills were used and many thousand feet of drilling was done on the *Voigt* group, and, in addition, about 1,500 feet of underground hand-work and several thousand feet of surface trenching. Work was stopped in December, but no information was then made public as to the company's intentions—whether or not it would make the large payment falling due under the bond. Some 700 feet of underground development and 1,500 feet of diamond-drilling was done on claims in the "upper camp," which adjoins the *Voigt* group on the south; the first payment under the bond on these claims has been made.

The ore met with in this camp varies, as a whole, from heavy hematite containing copper and iron sulphides with gold and silver, which ore is base, to ore containing a high percentage of silica with similar economic minerals. The geological features of the camp have not yet been thoroughly worked out, but as a rule the tendency of mineralization is along fracture zones extending in a general direction from the south-west towards the north-east, the surface mineralization being extensive. Details concerning the ore-bodies, however, have not yet been made known.

Princeton Coal Company.—The Princeton Coal and Land Company, operating a coal-mine at Princeton, completed its new coal-handling plant, which, though not a large one, is one of the most complete and efficient in the Province. When additional railway transportation facilities, now being provided, shall be available, a much-increased output from this company's colliery is looked for.

A very small quantity of coal was mined at a place a few miles east of Princeton. At the Columbia Coal and Coke Company's Coalmont property, situated between Granite creek and Collins gulch, back from Tulameen river, a commencement was made to mine coal. Some 5,800 tons was taken out, and, the railway having been extended from Princeton to Coalmont, a distance of about fifteen miles, a small shipment was made. Development of the coal-measures on this property is being continued.

Further particulars as to these coal-mines will be found in this Report under the heading of "Coal."

SIMILKAMEEN MINING DIVISION.

REPORT OF HUGH HUNTER, MINING RECORDER.

I have the honour to forward the annual mining report on the Similkameen Mining Division for the year 1912.

On Copper mountain the British Columbia Copper Mining Company has been operating on the *Voigt* properties, which it has under bond, and, as far as I learn, is well pleased with the claims it has tested; it is at present negotiating with Mr. Voigt for the purchase of them.

The company has also bonded other properties on the mountain, and on some has made the first payment.

The company, through its agent, has announced that it is there to stay.

On Roche river three claims have been bonded to a Chicago company, and first payment of purchase price made.

In Summit camp, situated at the head of Tulameen river, a number of claims have been bonded by Spokane parties, and considerable work has been done there during the past year. The difficulty of getting supplies into the camp has somewhat retarded the development-work.

I look for great activity in this camp during the coming summer.

In other sections of the district assessment-work has been performed.

OFFICE STATISTICS—SIMILKAMEEN MINING DIVISION.

Free miners' certificates.....	297
Special.....	3
Location records.....	322
Certificates of work.....	304
Conveyances (mineral claims).....	28
Placer leases.....	6
Permits.....	7
Powers of attorney.....	5
Conveyances (placer).....	10
Leaves of absence.....	2

LILLOOET DISTRICT.

LILLOOET MINING DIVISION.

REPORT OF C. PHAIR, GOLD COMMISSIONER.

I have the honour to submit the annual report on the progress of mining in Lillooet Mining Division during the year 1912.

MINERAL CLAIMS.

The past year's development was very similar to the previous year's. About the same number of men were employed in the different mines. All the companies are pleased with the result of the year's development. As was anticipated, a good deal of prospecting was done, resulting in 148 mineral claims being added to the list.

The mines were worked continuously during the year by the **Coronation Mines**. Mines, Limited, of Victoria, with an average force of ten men under the management of C. L. Copp; 800 feet of crosscutting, drifting, and upraising has been done, but the 10-stamp mill on the property was not operated. In the beginning of the season considerable ground-slucing was done, proving the veins to have great continuity.

On the *Countless*, crosscut tunnels were extended to the vein, giving a depth of 250 feet.

On the *Little Joe*, the lower tunnel, No. 4, was driven to the vein and some very good ore was found. A raise has been put through, connecting with the old workings, giving the depth of 360 feet. At the end of the year they had drifted 200 feet on the vein.

The **Lorne Amalgamated** Mines Company, Limited, has been developing its claims during the season with a force of seven men. A tunnel was run 200 feet on the lower level with the object of tapping the vein at a greater depth, and for conveying the ore to the mill more economically. A discovery of two more veins on the property was made by ground-slucing. The 5-stamp mill was run for a short time, crushing 111 tons of ore, which yielded \$1,120.

Pioneer.—A tunnel about 200 feet has been driven on this claim to crosscut the vein.

Wayside. D. C. Paxton, manager of the *Wayside* group, states: "During the past season a tunnel 120 feet was driven, and this fall the vein system previously worked was opened up at a level of 140 feet above Bridge river; this elevation being apparently the height of a long-continued wash of the ancient river.

"On the *Commodore* claim, a 10-foot vein was opened, having a porphyry capping, which, being an inset to the vein, the present width will continue. The veins in the diorite on Upper Bridge River district are easily opened, as they can be driven on direct, and the elevation along the river being about 1,200 feet, it eliminates the expense of crosscutting or sinking for a long time. Arrangements are being made to work the property extensively the coming season."

Besides the assessment-work on 159 claims, considerable work was done on some of the older claims, especially on the *Marconi*, *Wireless No. 1*, and *Wireless No. 2*, by Messrs. Fergusson and Walker, the owners. These claims are situated at Bridge river.

There was also a good deal of work done on the *Empire*, *Empire No. 1*, and *Empire No. 2*, situated at McGillivray creek, by the McGillivray Mountain Mines, Limited.

PLACER-MINING.

There is no improvement in placer-mining. None of the leases have been developed during the year.

Eldorado creek, recently discovered, is not sufficiently rich to pay individual miners, so it is now being acquired under leases.

OFFICE STATISTICS—LILLOOET MINING DIVISION.

Mineral claims recorded	148
Placer claims recorded	22
Certificates of work recorded	159
Conveyances recorded	47
Mining and dredging leases in force	33
Free miners' certificates issued	187

Revenue.

Free miners' certificates	§1,027 50
Mining receipts, general	3,584 65
Tax—Crown-granted mineral claims	403 50
Mineral-tax	34 36
	§5,050 01

CLINTON MINING DIVISION.

REPORT OF F. C. CAMPBELL, GOLD COMMISSIONER.

I have the honour to submit the annual report for the Clinton Mining Division of Lillooet District for the year ending December 31st, 1912.

In this connection, I regret to say that conditions remain practically the same as at the close of the previous year. No development or activity can be reported; the office statistics remain practically the same.

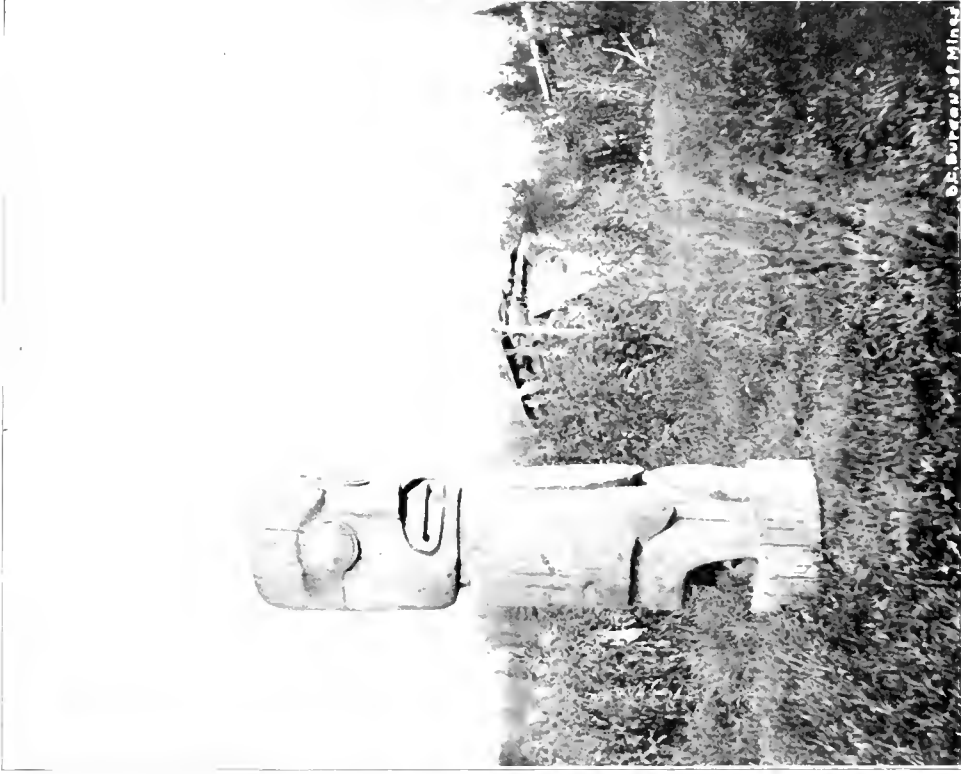
During the year the Canada Gold Dredging Company, Limited, secured dredging leases covering the bed of the Fraser river for a distance of sixty miles, extending from Black point to the mouth of the Chilcotin river; consequently, we may hope to see a dredge operating in this section in the near future.

OFFICE STATISTICS—CLINTON MINING DIVISION.

Free miners' certificates (individual)	70
Mineral claims recorded	73
Certificates of work issued	44
Conveyances, etc., recorded	34
Dredging leases issued	12



Canyon on Skeema, near Old Kulo.



Totem at Old Kulo—unusually for Inland.

Dr. Bureau of Mines

Dr. Bureau of Mines

VANCOUVER ISLAND AND COAST.

ALBERNI DISTRICT.

ALBERNI MINING DIVISION.

JOHN KIRKUP, GOLD COMMISSIONER.

I have the honour to submit the annual report on mining in the Alberni Mining Division during the year ending December 31st, 1912.

The mining operations in this district during the past year were confined to annual assessment-work only, with the exception of the *Big Interior* group, on which sufficient work was done to enable the owners thereof to obtain certificates of improvement on the group, consisting of eight claims.

The property known as the *Big Interior* has been taken up by an English company, the Ptarmigan Mines, of which H. H. Johnston, Victoria, is the local representative, and who sampled the property last fall; his assays ran high enough in copper to induce him to arrange to put a force of men at development-work this coming season. He is to establish a camp at the mouth of Bear river, in Bedwell sound, from which the easiest approach to the property is obtained.

The iron-ore properties on either side of Barkley sound have not had any work done on them this past year, nor have the copper properties on the north side of Alberni canal, near its mouth.

The development of the coal-seam near the Alberni townsite has for the present been suspended.

OFFICE STATISTICS—ALBERNI MINING DIVISION.

Mineral claims recorded.....	33
Certificates of work.....	46
Money paid in lieu of work.....	3
Certificates of improvement.....	13
Bills of sale, etc., recorded.....	11
Free miners' certificates (individual).....	49

CLAYOQUOT MINING DIVISION.

REPORT OF WM. SIMPSON, DEPUTY MINING RECORDER.

I have the honour to submit the annual report on mining operations in the Clayoquot Mining Division for the year ending December 31st, 1912.

A greater interest in mining matters is the feature of this year, and receipts show a marked increase over last year.

Assessment-work recorded was as follows:—

Copper King No. 3 (P. Sullivan)—tunnelling, 5 x 7 feet; stripping, about 20 feet.

Roosevelt (P. Wollan)—open-cut, 16 x 6 x 4 feet.

Walter (P. Wollan)—open-cut, 22 feet wide by 4 to 6 feet wide.

Prince Alfred (P. Wollan)—tunnel, 10 x 6 x 4 feet.

Golden Gate (John Chesterman)—tunnel, 10 feet wide by 6 feet high.

Lucky Jim and *Archibald* (A. Woller and T. D. A. Purves)—removing hanging-wall, exposing vein, removing about 2 tons ore to adjacent ledge.

Bear River (Fred Drinkwater)—open-cut, 6 x 4 x 20 feet.

Copper (W. Lindsay)—clearing out shaft and tunnel, stripping copper and iron showing, and other prospecting-work.

Tangent (G. A. Drinkwater)—open-cut, stripping 20 feet wide, 4 feet deep by 4 feet face, and other prospecting-work.

New Crow (G. W. Drinkwater)—clearing out tunnel and stripping showings of magnetic iron and other prospecting-work.

Mickey (Fred Drinkwater)—open-cut, 7 feet in and about 9 feet face, clearing up broken-down ore-shaft, and other prospecting-work.

Kallappa.—This group has been taken over by a Vancouver syndicate, who has had about six men working it for the last six months under the managership of Fred Meloche.

The following notes regarding the *Kallappa* group have been kindly supplied by Mr. Cartwright:—

“For your annual report you might like some notes of work done on *Kallappa* group on Meares Island.

“Claims included in group consist of *Kallappa*, *Golden Gate*, *Suinik Fraction*, *Jack of Clubs*, *Homatsa*, and *Syonll*.

“Owned by John Chesterman *et al.*, Tofino, B.C., under bond to C. E. Cartwright, civil engineer, 601-S Rogers Building, Vancouver, acting for a Vancouver syndicate.

“Work under the bond commenced about the end of May, 1912, since which date an average of five miners, under Foreman Fred Meloche, has been continuously engaged.

“Work done during 1912 consisted of 325 feet of drifting on vein; survey of four of the claims. The construction of a wagon-road, about 3,000 feet long, from workings to wharf-site has been commenced. With work done previously there is now a total of 540 feet drifting done and 140 feet crosscutting.

“The ore is arsenical iron-pyrites and pyrrhotite carrying values in gold and silver, with copper values in some of the ore.

“Frank E. Leach, of Cartwright, Matheson & Co., Vancouver, B.C., is the manager. We hope to be able to make some shipments during 1913.”

OFFICE STATISTICS—CLAYOQUOT MINING DIVISION.

Free miners' certificates	25
Certificates of work recorded	19
Mineral claims recorded	48
Powers of attorney, transfers	6
Permission to relocate	4
Relocations	4
Other receipts	6

Revenue.

Free miners' certificates	\$ 107 75
Mining receipts, general	1,431 30
	\$1,539 05

Payments in lieu of assessment-work was made on the following: *Island Belle Nos. 1 and 2, Iron King, Pete, Ivanhoe, Double Standard, Gordon, Hollinger, Rose, Mamie, Maggie, Sadie.*

CLAYOQUOT MINING DIVISION.

NOTES BY H. CARMICHAEL, PROVINCIAL ASSAYER.

Rose Marie Group. This group of mineral claims is situated on the left bank of Elk river about four miles from the mouth. The property was reported on by the Provincial Assayer in 1899. A quartz vein outcrops on the steep mountain-side, but is covered at the bottom by an extensive rock-slide; the vein, which shows from 15 to 24 inches wide on the surface, had been prospected by the original owners by a series of open-cuts extending to the top of the mountain, at an elevation of 1,000 feet, and on to the top for 100 or 200 feet; these owners also erected a small crushing plant and concentrator.

Owing to a dispute as to title, and other reasons, the property lay for a long time without further development, but recently other parties started a tunnel several hundred feet up the mountain, where the vein showed the best ore.

This tunnel has been driven directly into the hillside on the strike of the vein for a distance of 307 feet; the vein is clearly defined throughout the entire length and has an average width of 18 inches.

The mineralization is pyrite and arsenopyrite, with a few specks of chalcopyrite showing here and there. A sample taken recently by a mining engineer, and said to represent a fair average of the ore in the tunnel, gave a value of \$12 a ton, nearly all in gold.

Leora Mineral Claim. Owned by Hanbury & Bowes, Victoria. This property is situated on the left bank of the Elk river about two miles from the mouth; the mine cabin is 300 or 400 yards back from the river. The mountains rise abruptly from the narrow valley of Elk river; at many points the slopes are precipitous. A small creek flowing into Elk river has exposed a quartz vein a foot wide mineralized with arsenical pyrites. To prospect this vein a tunnel has been driven 210 feet east (magnetic) following the strike of the vein, which runs into the mountain-side. The tunnel, for some distance, is in a shattered zone of diabase showing much slicken-siding and with a calcite filling, carrying a little arsenical pyrites along a well-defined hanging-wall.

At 75 feet from the tunnel portal a winze has been sunk 40 feet at an incline of 60 degrees. At the bottom of the winze there is 60 feet of drifting on the vein, which swells at one point to 2 feet wide, but at the face is only 6 inches.

After passing the winze there is no distinct quartz vein, but there is a distinct parting on the hanging-wall side. This may be the hanging-wall of the fissure or only a parting in the filling. The face shows pyrite and arsenopyrite, principally in calcite, with a little quartz and slicken-sided country-rock. The principal value is in gold; 8 tons of the best ore gave a smelter return of \$110.

 QUATSINO MINING DIVISION.

REPORT OF O. A. SHERBERG, MINING RECORDER.

I have the honour to submit the annual report on the mining operations in the Quatsino Mining Division for the year ending December 31st, 1912.

On twenty-seven of the mineral claims situated at Elk lake, located last year, assessment-work was performed, and the owners seem to be well pleased with the result, as they say that showings are fully as good as expected.

These claims are defined as follows: The *Old Sport* group of eight claims; the *Shamrock* group of three claims; the *Blue Bird* group of four claims; the *Idaho* group of three claims; the *Merry Widow* group of six claims; the *Young Sport No. 3* and the *Young Sport No. 4*.

Young Sport No. 1—cash paid in lieu of work, \$100.

On the *Teeta River* group, owned by the Teeta River Mining Company, the tunnel started last year on the *Quatsino King* claim was extended by 40 feet.

The B.C. Pottery Company, under management of John L. Hangi, has shipped during the year 2,981 tons of shale from its property, situated at Kyuquot sound, the *A. T. Monteith* and *Sockeye* mineral claims, but the value of the shale is not known here. The company has had seven men steadily employed during the year, and, beside the mining done, has built a new wharf.

Cash in lieu of work, \$100, was paid for the *Reno* and *Montezuma* mineral claims, situated near Lawn point.

On other claims work was carried on, and certificates of work were recorded for eighty-six claims.

On the coal claims, situated on the West arm of Quatsino sound, owned by the Quatsino Coal Syndicate, development was carried on until the first part of November, when the work was closed down for the winter.

OFFICE STATISTICS—QUATSINO MINING DIVISION.

Free miners' certificates.....	56
Mining claims recorded.....	42
Certificates of work recorded.....	86
Certificate of improvement.....	1
Bills of sale, etc., recorded.....	9

NANAIMO DISTRICT.

NANAIMO MINING DIVISION.

REPORT OF GEORGE THOMSON, GOLD COMMISSIONER.

I have the honour to submit herewith the annual report on the mining operations in the Nanaimo Mining Division for the year ending December 31st, 1912.

The past year has been very dull on Texada island. The only mine **Marble Bay.** really working during the first half of the year was the *Marble Bay*, shipping its usual complement to the smelter. The rich lenses of bornite have been worked on the 1,300-foot level and on several of the upper levels; the shipping of ore stopped in the fall of the year. The company decided to sink the shaft down to the 1,400-foot, hence all workmen were laid off, and the sinking is now progressing and nearing completion; the mine is expected to be ready for opening up again shortly. The ore, I am informed, is richer at 1,400 feet than it was in the upper levels.

The *Little Billie* company is also sinking the shaft, and has opened **Little Billie.** up thereby some highly encouraging lenses of ore; there seems to be a promising outlook ahead. As soon as the required depth is obtained, levels will be driven on the vein and stoping begun, preparatory to resuming shipments. A streak of rich ore was found of late which, if continuous, will fully warrant the expenditure entailed.

The *Rose and Belle* seems to be at a standstill, as the ore, if any, is evidently not fulfilling the sanguine expectations of its initiatory stage.

The owners of the *Dickens* are now drifting to see if they can reach stronger veins of greater magnitude. Some tons of very interesting ore has been found.

The *Cornell* is again being opened up for operation, with fairly good showings.

The *Raven* has been closed down for some time.

The *Cap Sheaf* company has done considerable work on its property during the past year, and hopes to be able, ere long, to report the discovery of good commercial ore.

The *Sentinel* group has been worked more or less during the year, and while there are some nice samples of silver-lead ore, the vein proper has not yet been struck.

The *Malaspina* mines has done nothing beyond a little prospecting on the property; the steam plant being idle.

The *Mammoth* tunnel, 7 x 9 feet, has not been pushed ahead much during the year, but it is expected that 1913 will see this work going ahead.

The iron-mines are still idle. The lack of works capable of handling iron-ore is probably the chief reason of the mines being idle.

Carter & Sons' new vein at the high-water mark is looking remarkably fine as depth is reached. It is now about 15 feet deep, with a good pile of ore on the dump; the shipping facilities are at the collar of the shaft.

Considerable development-work has been done throughout the Division.

OFFICE STATISTICS—NANAIMO MINING DIVISION.

Free miners' certificates (individual)	161
" " (company)	2
Mineral claims recorded	195
Certificates of work recorded	248
Certificates of improvements recorded	18
Transfers and agreements recorded	61

VICTORIA DISTRICT.

VICTORIA MINING DIVISION.

REPORT OF HERBERT STANTON, GOLD COMMISSIONER.

There is very little lode or placer mining going on at present in the Victoria Mining Division, but there is quite a large output of other economic mineral products.

LODE-MINING.

In the vicinity of Port Renfrew, on the south-west coast of the Island, a large number of claims have been staked on deposits of magnetic iron-ore; a number of these properties have been reported upon by the Provincial Assayer in the 1902 Report of this Department, since when others have been staked.

From these reports it appears that there is a large tonnage of iron-ore of very good quality, but, as there is at present no market for iron-ore on the Coast, there has of late been little active development going on, the owners contenting themselves with doing the necessary assessment-work preparatory to Crown-granting the properties. Most of the claims staked have been kept in good standing.

The properties on Sooke peninsula, on which occur considerable bodies of copper-ore of good quality, are, for the most part, Crown-granted, and no active development-work has been done on them for some years.

These properties were examined by the engineer of an Eastern mining company last fall, and it is possible they may be actively operated this coming season, as the Tyeé Smelting Company has announced it is to start up its smelter at Ladysmith, which will create a demand for copper-ores.

On the west coast prospecting for coal and oil has been carried on for the past two or three years, but so far without proving anything.

CEMENT.

The only Portland-cement plant in actual operation is situated in the Victoria Mining Division at Tod inlet, on the Saanich arm, about twelve miles from Victoria.

The plant is owned and operated by the Vancouver Portland Cement Company—R. P. Butchart, President; office, Board of Trade Building, Victoria.

The raw materials for making the cement—clay and limestone—are mined on the company's property adjacent to the plant. The capacity of the plant is from 2,000 to 2,500 barrels of cement a day; the output made during the past year was about 520,000 barrels of cement, having a value of approximately \$800,000.

The plant is thoroughly equipped, and is operated largely by electric power transmitted from the B.C. Electric Company's power plant at Goldstream.

Another large cement-plant is now being constructed at the upper end of Saanich inlet by the Portland Cement and Construction Company—an English Company—which ought to be producing within a year.

The Rosebank Lime Company—W. F. McTavish, manager, Esquimalt—manufactures lime at the west side of Esquimalt harbour, employing about twelve men and producing this year about 55,000 barrels of lime, valued at about \$55,000.

The Vancouver-Victoria Lime and Brick Company, at Atkins Siding, produced some lime and made about 3,500 M. lime-silica brick, valued at about \$25,000.

The B.C. Pottery Company, Ltd., manufactured clay products, chiefly sewer-pipe, having a value of approximately \$130,000.

In this Division there was made this last year, at the yards near Victoria and on Sidney island, approximately 15,000 M. red brick, having a total value of nearly \$140,000.

The Producers Rock and Gravel Company, Limited, mined at Albert head about \$17,000 worth of crushed trap-rock; \$132,000 of gravel; \$57,000 of sand—all of which was used in making concrete.

OFFICE STATISTICS—VICTORIA MINING DIVISION.

Free miners' certificates issued.	564
Special certificates issued.	10
Mineral claims recorded.	50
Placer claims recorded.	3
Certificates of work recorded.	44
Certificate of improvement.	1
Conveyances recorded.	8

Revenue.

Free miners' certificates.	\$5,499 95
Mining receipts, general.	2,505 80
Total.	<u>\$8,005 75</u>

NEW WESTMINSTER MINING DIVISION.

REPORT OF IRVING WINTEMUTE, MINING RECORDER.

I have the honour to submit the following report of mining operations in the New Westminster Mining Division for the year 1912. :—

The mineral claims recorded during the year were distributed as follows :—

Howe Sound and vicinity.	41
Britannia and vicinity.	24
Capilano, Lynn, and Seymour creeks.	14
North arm, Burrard inlet.	17
Squamish.	12
Sechelt peninsula.	3
Jervis inlet.	2
Pitt lake.	56
Stave lake and vicinity.	4
Whonnoek.	1
Chilliwack and vicinity.	43
Total.	<u>217</u>

On August 1st, 1912, a large portion of the New Westminster Mining Division was formed into a new and separate Mining Division—the "Vancouver Mining Division," with the Mining Recording Office at Vancouver.

In consequence of this, the New Westminster office statistics show a decreased revenue and less business done than in the previous year, due to the fact that a great part of the business formerly done here is now transacted at the Vancouver Mining Recording Office.

OFFICE STATISTICS—NEW WESTMINSTER MINING DIVISION.

Free miners' certificates issued.....	1,751
Quartz claims recorded.....	217
Certificates of work recorded.....	172
Certificates of improvement recorded.....	19
Conveyances recorded.....	77

Revenue.

Free miners' certificates.....	\$12,177 56
Mining receipts.....	3,217 55
Total.....	15,395 11

VANCOUVER MINING DIVISION.

REPORT OF J. MAHONY, MINING RECORDER.

I have the honour to submit the following report of mining operations in the Vancouver Mining Division, from August 1st to December 31st, 1912:—

On August 1st, 1912, a large portion of the New Westminster Mining Division was formed into a new and separate Mining Division—known as the “Vancouver Mining Division,” with its Mining Recording Office at Vancouver.

The claims recorded in the Vancouver Mining Division during the above short period are located in the following vicinities:—

Britannia mountain and valley.....	28
South valley.....	13
West side of Howe sound.....	2
North arm of Burrard inlet and Indian river.....	7
Nelson island.....	3
Lynn and Seymour creeks.....	8
Pemberton trail.....	1
Hollyburn mountain.....	5
Crown mountain.....	8
Salmon arm.....	3
Porteau.....	6
Total.....	117

This Division having been established in August last, the returns are not in proportion to what they would be for the year, as the majority of licences were issued before May 31st, and most of the claims located in the earlier part of the year.

The Britannia Mining and Smelting Company, Limited, of Britannia Beach, is the only company shipping ore in this district at the present time. It has made great strides in its operations, and more than trebled last year's output. At present it has between 650 and 700 men employed at its works. An auxiliary steam plant has been installed at the Beach, and it has built a large number of cottages for its employees' use. In the early part of this year the company established an up-to-date hospital, and keeps a trained nurse in attendance. A large store is now in course of construction, and the company's aim is to have everything needed on the ground for its employees' benefit.

The following is a note by the Provincial Mineralogist:—

“*Britannia Mines.*—The extent to which the Britannia Mining and Smelting Company has enlarged its mining and concentrating operations, and the present and steadily increasing importance of the copper-mining industry this company has established on its property on and near Howe sound, are not generally known in the Province. Between 600 and 700 men have been continuously employed for some time past, and the extensive development and construction works in hand, and to be undertaken as soon as can be done with advantage, assure the retention of fully that number at work for some time to come. Outlining briefly what is being done, it may be mentioned that, while the mines are being developed and ore extracted on a larger scale than in past years, the work of driving a 5,000-foot adit is also in progress, with 3,000 feet already driven and a daily advance of about 15 feet being made. As this tunnel is being driven on a level 1,200 feet below the bottom of the lowest present mine-workings, it will, if ore be found to continue down to that depth (which will give a total of fully 2,200 feet), make accessible for stoping an enormous quantity of ore. Mine equipment on a commensurate scale, hydro-electric development of 5,000 horse-power, construction of railway from the mouth of the adit tunnel to Britannia Beach and other additional facilities for transportation, and the installation of a modern and effective system of ore-concentration, are included in the progressive programme adopted and being energetically carried out. It is understood that the ‘flotation process’ of the Minerals Separation, Limited, for the recovery of copper-minerals has been adopted here, and that a large treatment-capacity is being arranged for, with the old concentrating-mill being altered to suit the new conditions and for use pending the erection and equipment of a new mill. The company mined about 193,000 tons of ore in 1912, as against rather more than 100,000 tons in 1911, and recovered between 14,000,000 and 15,000,000 lb. of copper and between 70,000 and 80,000 oz. of silver.”

On the West fork of Lynn creek the Lynn Creek Zinc Mines, Limited (Non-Personal Liability), has acquired a group of claims, which are situated on the ridge extending eastward from Crown mountain, seven miles by road and trail from the end of the Lynn Valley car-line, and about ten miles in an air-line from the city of Vancouver. On these claims, three parallel ore-zones, known as the East, West, and Fleming, respectively, have been discovered, as well as some cross-veins, on all of which work has been done during the year.

I am indebted to Newton W. Emmens, mining engineer, of Vancouver, who is in charge of the work, for the following information regarding this property:—

“The formation in which the ore-deposits of the Lynn creek area occur consists of highly altered volcanic and sedimentary rocks of the Palaeozoic era, metamorphosed by the intrusive action of the Coast Range granitic uplift into crystalline lime-stones, calcareous epidotic rocks, epidote schists, garnetites, quartzites, etc., with a considerable development of such secondary minerals as actinolite, garnet, epidote, pyrite, magnetite, and graphite. The intrusive action of this uplift not only altered the overlying rocks, but crushed and shattered them, especially along their bedding-planes, affording avenues for the circulation of magmatic waters and other mineralizing solutions, which accompanied, and followed, this geologic disturbance.

“The ore-bodies occur along these zones of crushing in the altered Palaeozoic rocks, not only near their contact with the granitic intrusive, but also at some distance therefrom, and along some of the east and west faults which cut the formation in several places.

“The most important ore-deposit so far opened up on the Lynn Creek Zinc Mines property is known as the ‘East ore-body,’ and occurs along a zone of crushing between a limestone hanging and a quartzite foot wall. The ore-body consists of zinc-blende in a gangue of calcareous epidote rock, with some quartz, and has a course of N. 10° to 20° W. (mag.), with a steep westerly dip. On the *Kemprville Extension* claim it is exposed in the bluff, forming

the east side of Zinc canyon, and has been opened by surface cuts and an adit crosscut, in which the ore has been proved to have a width of 20 feet, much of which assays from 40 to 45 per cent. in zinc, and the balance from 8.26 to 16.72 per cent. zinc. From this crosscut a drive has been made north along the course of the ore for a distance of 22 feet, carrying the quartzite as the foot or east side of the drive. This work is in ore all the way, average samples of which assay from 10.5 to 13.8 per cent. zinc, these samples being taken in the regular course of the work without any of the waste being sorted out, as would be the case in mining the ore. Two hundred and twenty feet north of this crosscut the continuation of the ore-deposit has been proved by diamond-drilling, and is sixteen feet wide at that place, as shown by the core. Still farther north, near the boundary between the *Kemptville Extension* and *Evening Star* claims, and at an elevation of 300 feet above the crosscut above mentioned a shoot of ore, carrying galena, has been opened up by means of surface cuts and an adit driven on its course for a distance of 60 feet. This shoot, which is known as the 'Pearson shoot, is over 6 feet wide, and average samples taken at various times during the progress of the drive assayed from 5 to 15 ounces in silver a ton; 15 to 30 per cent. in zinc; 35 to 46 per cent. lead, with traces of gold.

"Near the north boundary of the *Evening Star* claim, the 'East ore-body' has been opened by a series of cuts made at right angles to the strike of the ore, and proving its continuity for a distance of over 400 feet along its course, and to have a width of from 12 to over 30 feet (the face of some of the longer cuts still being in ore). Average samples of ore taken from these cuts assayed from 0.4 to 0.5 oz. silver to a ton; 21.5 to 37 per cent. zinc, and traces of gold. In the *Cooper* cut, which is made in the steep slope of the ridge, the ore is well exposed in the face, with a width of 12 feet between walls at right angles to its strike, and is 1,220 feet vertically above, and 2,100 feet north-westerly from the adit crosscut in Zinc canyon, previously spoken of.

"The 'West' ore-body parallels in strike the 'East,' and outcrops near the foot of the bluff forming the west wall of Zinc canyon, and on the west side of the limestone which forms the hanging-wall of the 'East' ore-body. The 'West' ore-body has been opened by stripping and cuts along its strike for a distance of over 400 feet, near the western boundary of the *Kemptville Extension* claim, and by a crosscut driven in from the floor of Zinc canyon. The width of the ore varies from 1 to 5 feet and averages about 28 per cent. in zinc-contents. The dip of this ore-body is to the east, and there is good reason to believe that it will make junction with the 'East' ore-body at depth.

"The 'Fleming' ore-body follows a line of faulting and crushing which is exposed in Fleming canyon, 1,500 feet east of Zinc canyon; it has been opened by a cut on the west side of the canyon near the boundary line between the *Kemptville Extension* and *Morning Star* claims, where it is 7 feet wide, samples from which assay 3 oz. silver to the ton and 35.5 per cent. zinc. The strike of the ore-deposit is N. 60° W. (mag.), with an almost vertical dip. The ore follows up the bed of Fleming canyon, the gradient of which is very steep, where it is exposed in a few places (which are bare of rocky debris), and outcrops again in a bluff forming the east wall of the canyon, near its head, 1,800 feet north-west of and 1,000 feet above the cut previously mentioned. At this outcrop some open-cut work has been done, exposing over 10 feet of ore containing galena and zinc blende in a calcareous epidote gangue, samples from which assayed from 0.02 to 0.05 oz. gold; 20 to 25 oz. silver to the ton; 9 to 12 per cent. lead; and 12 to 22 per cent. zinc.

"Of the cross-veins, which have a strike of S. 70° E. (mag.), work has only been done on two of them, one on the *Kemptville Extension* and one on the *Evening Star* claims. The ore in these veins is from a few inches to as much as 10 feet in width where the faults intersect zones of crushing, and is of a good grade.

“During the year 1912 there was 619 feet of work done on the property, consisting of 59 feet of cross-cuts, 91 feet of drives, and 469 feet of surface cuts of an average depth of 8 feet, and, in addition, 411 feet of diamond-drilling.”

The Latona Mining Syndicate, whose claims are on Gambier island, most of which were recorded during 1912, has had a lot of development-work done on its property.

The balance of work done in this district has been recorded to keep the claims in good standing.

OFFICE STATISTICS—VANCOUVER MINING DIVISION.

Free miners' certificates issued	261
Quartz claims recorded	127
Certificates of work issued	106
Receipts issued for money in lieu of work	22
Certificates of improvement issued	23
Conveyances recorded	55
Abandonments recorded	16
Notices filed	12
Crown grants applied for	16

Revenue.

Free miners' certificates issued	\$1,419 90
Mining receipts	3,274 95
Total	<u>\$4,694 85</u>

INSPECTION OF MINES.

REPORT OF THOMAS GRAHAM, CHIEF INSPECTOR.

I have the honour to submit my first annual report as Chief Inspector of Coal and Metalliferous Mines.

The reports of the District Inspectors, covering the production of coal and coke, the number of persons employed, and lists of accidents and prosecutions, also a brief résumé of the mines in their several inspectorates, are hereto appended.

PERSONNEL AND ORGANIZATION OF INSPECTION STAFF.

The personnel of the inspection staff consists of a Chief Inspector and six District Inspectors, namely:—

Thomas Graham, Chief Inspector, Victoria ;
Thomas Morgan, Nanaimo ;
James McGregor, Nelson ;
Evan Evans, Fernie ;
Robert Strachan, Merritt ;
John Newton, Nanaimo ;
Thomas H. Williams, Fernie.

At the beginning of the year 1912 the headquarters of the Chief Inspector was moved from Nanaimo to Victoria, and an office opened in the Mines Department at the Parliament Buildings, bringing the entire Inspection Service more in touch with the Department, eliminating much duplication of correspondence, enabling the Chief Inspector to get more in the field, and dispensing with the services of one stenographer.

A reorganization of the Inspection Districts was also effected: Inspector John Newton was moved from Cumberland to Nanaimo, Inspector Robert Strachan from Hosmer to Fernie, and Inspector Evan Evans from Craubrook to Fernie. This was deemed necessary to facilitate consultation and co-operation of the Inspectors at Nanaimo and Fernie, enabling their itinerary to be so arranged that one or other of the Inspectors would always be at these important centres, and also to minimize the travelling expenses of the staff.

During the year, one Inspector was added to the staff in the person of Thomas H. Williams, with headquarters at Fernie, Inspector Robert Strachan of that place being moved to the Nicola-Princeton District, with headquarters at Merritt.

In addition to the regular monthly inspection of the District Inspectors, I have personally visited and inspected every operating coal-mine in the Province at some time during the year,

ACCIDENTS IN COAL-MINES.

Notwithstanding the above frequent and systematic inspection, the number of fatal accidents is again very high and leaves much room for improvement.

The returns show twenty-two accidents, which caused twenty-eight deaths; this is an increase in deaths of twelve over 1911 and equals the number reported in 1910.

There were 7,130 persons employed in and around the coal-mines, making the fatal accidents per 1,000 persons employed 3.93, while in 1911 the rate was 2.32. The fatal accidents per 1,000 persons employed for the ten-year period averages 4.87.

The tonnage produced in 1912 was 3,025,709 tons, being 727,991 tons greater than in 1911.

The following table shows the collieries at which these fatal accidents occurred:—

Canadian Collieries (Dunsmuir), Limited, Cumberland	4
Western Fuel Company, Nanaimo	3
Nicola Valley Coal and Coke Company, Middlesboro	1
Diamond Vale Collieries, Limited, Merritt	7
Crow's Nest Pass Coal and Coke Company, Coal creek	7
Crow's Nest Pass Coal and Coke Company, Michel	2
Hosmer Mines, Limited, Hosmer	1
Corbin Coal and Coke Company, Limited, Corbin	3
Total	28

The following table shows the various causes of the fatal accidents and their percentage on the whole:—

Cause.	No.	Per cent.
Falls of roof-rock	6	21.43
Falls of coal	3	10.72
Mine-cars and haulage	9	32.14
Explosion of gas	7	25.00
Explosion of powder	1	3.57
Hit with piece of coal from a shot	1	3.57
Heart-disease accelerated by fright	1	3.57
	28	

It will thus be seen that, again, falls of roof-rock and coal and mine haulage account for the greater number of fatal accidents—namely, 18, or 64.28 per cent. of the whole.

Seventy-five per cent. of these eighteen accidents were avoidable, and were due either to negligence of the persons injured or to lack of proper discipline on the part of officials: and here there is hope for reduction in the future through the co-operation of the inspection staff, the mine officials, and the mine employees.

Legislation, be it ever so stringent, or inspection, however efficient, will not prevent this class of accident: here so much depends upon the personal element that only the united and co-operative effort of every person in the industry, from the Inspector and manager to the trapper-boy, can hope to reduce this class of accident to a minimum.

Accidents of this nature will always occur so long as we continue to produce coal, but the unforeseen and unavoidable accidents will be only too numerous without adding those due to negligence or lack of discipline.

I would therefore urge the co-operative aid of the underground officials, especially fire-bosses and shotlighters, who are daily coming in contact with each and every employee in the mine, as well as the aid of each individual employee in reducing this class of accident.

My personal experience as a miner and as a mine official has proven that the average mine-worker is only too prone to forget that first and great consideration, that all coal-mines are dangerous, and that danger lurks in every corner; they become inured to the dangers surrounding them to such an extent that all more or less fail to be as careful as they might be, and daily overlook with indifference many little violations of well-known rules or prudent precautions on the part of fellow-workers, that finally culminate in a fatal accident of the type that may well be written in the class of avoidable. Only an ever-present consciousness of danger on the part of every mine-worker will bring about that vigilance that is necessary to prevent these accidents.

An explosion of gas caused seven deaths, or 25 per cent. of the whole; this was the most serious accident of the year, and occurred in No. 3 slope of the Diamond Vale Collieries at Merritt at 8.15 a.m. on March 7th, 1912, through the ignition of fire-damp in Nos. 13 and 14 breasts off No. 1 East level.

An investigation of this accident was made on behalf of the Diamond Vale Collieries by James Ashworth, and on behalf of the Government by William Fleet Robertson, Provincial Mineralogist, and by the writer, all of whom agree as to the place and cause of the accident.

The reports of Mr. Robertson and the writer, as submitted to the Honourable the Minister of Mines, are hereto attached.

Of the three miscellaneous fatal accidents, one was caused by an explosion of powder, and was due to one of those vagaries so common to high explosives, and which so frequently fail to be accounted for. The explosion occurred while the powder was being inserted in the hole, no detonating-cap being in the powder.

One was caused by a piece of coal flying from a shot, and was due to lack of warning to the persons working in an adjoining stall, towards which a crosscut was being driven, and in which crosscut a shot was being fired, the shot blowing through and killing a man at work on the other side. In this case a charge of manslaughter was brought against the official firing the shot, the case being dismissed.

The other was due to heart-disease, accelerated by shock or fright.

Under instructions from the Minister of Mines, I was delegated to attend the Fourth Annual Convention of the Mine Inspectors' Institute of the United States, held at Columbus, Ohio, June 17th to 21st, 1912; also to visit the United States Bureau of Mines Testing Station at Pittsburg, Pa., for the purpose of ascertaining the methods employed in testing permitted explosives and noting their action in the presence of known quantities of gas and coal-dust; and also to visit some of the representative coal-mines in the States of Pennsylvania and Illinois, with a view to comparing the general discipline enforced and the efforts put forth by the individual operators in those States to safeguard and protect the lives of their employees, with the general discipline enforced and the efforts put forth by the various companies in our own Province.

Appended hereto is the report as submitted to the Honourable the Minister of Mines.

MINE-RESCUE WORK.

It affords me much pleasure to be able to report much progress in this important branch of the work in 1912.

The Canadian Collieries (Dunsmuir), Limited, built a very commodious and well-arranged station at both its Extension and Cumberland Collieries.

The following companies added to their equipment, as follows:—

Western Fuel Company, Nanaimo—Four 2-hour and three 1-hour Fluess apparatus.

C.N.P. Coal and Coke Company, Limited, Fernie—Six 2-hour Draeger and two 2-hour Fluess apparatus.

Columbia Coal and Coke Company, Coalmont—Three 2-hour Draeger apparatus.

Princeton Coal and Land Company, Princeton—One 2-hour Draeger apparatus.

Diamond Vale Collieries, Merritt—Three $\frac{1}{2}$ -hour Draeger apparatus.

Inland Coal and Coke Company, Merritt—Three $\frac{1}{2}$ -hour Draeger apparatus.

In addition to this, the Provincial Government purchased two 2-hour 1911 mouth-breathing type Draeger apparatus, and sufficient material to convert the fourteen 1910 model helmet type apparatus—already owned by the Province—into the 1911 model mouth-breathing type, and two (2) ambulance stretchers equipped with oxygen-feed, to enable injured men being carried through a zone of irrespirable gases.

The number of oxygen apparatus in the Province at the end of the year is eighty-eight : of these, forty-nine are 2-hour Draeger apparatus ; thirty $\frac{1}{2}$ -hour Draeger apparatus ; six 2-hour Fluess (Proto) type and three 1-hour Fluess (Salvator) type apparatus. This gives one apparatus for every eighty-one persons employed in the coal-mining industry.

The Crow's Nest Pass Coal Company, Limited, Fernie, very generously donated to the Provincial Government a site for a mine-rescue station at a central place, easily accessible by road or railway in the city of Fernie. A very commodious and well-appointed station has been erected on this site, and was opened on November 1st, with George O'Brien as instructor and caretaker, under the supervision of the District Mine Inspectors, who have their office in the station. The number of applications received for training speaks well for the interest taken in the rescue-work.

A site was purchased in the city of Nanaimo, upon which a station is now under construction.

Pending the completion of this station, the apparatus, equipment, and stores owned by the Government are, through the courtesy of the Western Fuel Company, housed at their mine-rescue station.

John D. Stewart, who has been appointed instructor for the Government station, is now with the aid and instruction of Joseph Pearson, of the Western Fuel Company's station, converting the Government's 1910 model apparatus into the 1911 or latest model.

Much progress in training has been made by several of the local companies, some of whom issue diplomas to their employees who take a course of training.

On May 10th last, the writer, on the invitation of the Western Fuel Company, had the honour and pleasure of presenting forty-one employees of that company with certificates of competency in mine-rescue work. This company has issued sixty-three certificates of competency since the opening of its station.

In November last, Inspector Strachan had the honour and pleasure of presenting fourteen employees of the Nicola Valley Coal and Coke Company with certificates of competency earned at that company's station.

FIRST AID TO THE INJURED.

Previous to 1912, instruction in ambulance and first-aid work was carried on at most of the collieries in the Province, through the colliery doctors, chiefly to enable intending applicants for certificates of competency under the "Coal-mines Regulation Act" to qualify under the provisions of that Act, but with no fixed standard of remuneration for efficiency. It is therefore pleasing to note that the St. John's Ambulance Association has established centres in most of the coal-mining communities, and from now on there will be a fixed standard of examination and uniformity of training throughout the Province.

With the aid of the St. John's Ambulance Association, I hope to see much rivalry in the various mining centres during the coming year.

While on official business at Merritt during the month of March, 1912, I received an invitation to attend a meeting of the Nicola Valley Mutual Improvement Association.

The members of this organization were employees of the Nicola Valley Coal and Coke Company, Middlesboro, and held weekly meetings in the club-room owned by the employees at Middlesboro. Its aims and objects are mutual improvement of its members through the reading and discussion of papers on mining subjects.

A very pleasant evening was spent in the reading and discussion of a paper entitled "Mine Accidents and how to prevent them"; much interest was evinced in the paper, the discussion of which brought out much that was helpful to students of this subject. I was informed that the interest was well-sustained during the winter, the average attendance being thirty members.

A similar association has been formed at Nanaimo and is meeting with much success. It is to be hoped that more of these associations will be formed in other mining communities, not only for the educational advantages to be obtained by participation in these discussions, but for the quickening of the powers of observation, revealing to the acute eye many of the conditions and phenomena within the mine, the details of which escape the notice of a large majority of those employed in the industry.

METALLIFEROUS-MINE ACCIDENTS.

There were seven separate fatal accidents, causing the loss of eight lives, during the year 1912. The number of fatalities in 1911 was seventeen.

The fatal accidents per 1,000 persons employed was 2.11, as compared with 5.24 for the year 1911.

The production of the metalliferous mines for 1912 is the largest recorded in the history of the industry in the Province, and it is worthy of note that the fatal accidents per 1,000 persons employed is the smallest recorded in the nine years during which such records have been kept, the smallest previous year being 1905, when the rate was 3.89.

Of these eight fatal accidents, two were due to picking into missed holes or unexploded powder; one from going back on a delayed shot; three from falling into chutes; one from suffocation from powder-gas; one from a shaft accident, caught with cage.

Notwithstanding the great care exercised by officials and employees in the use of explosives, this class of accident again claims three lives.

Falling into chutes is another prolific source of accident in our metalliferous mines, and a class that may well be termed avoidable.

One very noticeable feature of this year's accidents is that there were no fatalities from falls of ground; when we consider that many of the largest producing mines are worked on the large open-stope system, with no timbering, it speaks volumes for the supervision and care of the officials and employees, and suggests to us that with a fraction of the amount of care which must have been devoted to this work bestowed on the open chutes, we might eliminate the chute accidents entirely.

The results in the metalliferous mines for the year are very encouraging, and whilst the death-rate of 2.11 per 1,000 persons employed is even higher this year than the results obtained in some of the European countries, it is nearer the ideal to which we aim, and which can only be obtained by a cheerful compliance with the rules laid down to maintain discipline on the part of the employee, and eternal vigilance upon the part of the mine officials and inspectors. The co-operation of all will enable us to place British Columbia in the column of mine statistics that will compare favourably with that of any other mining country.

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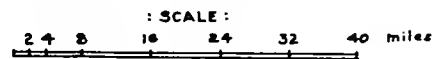
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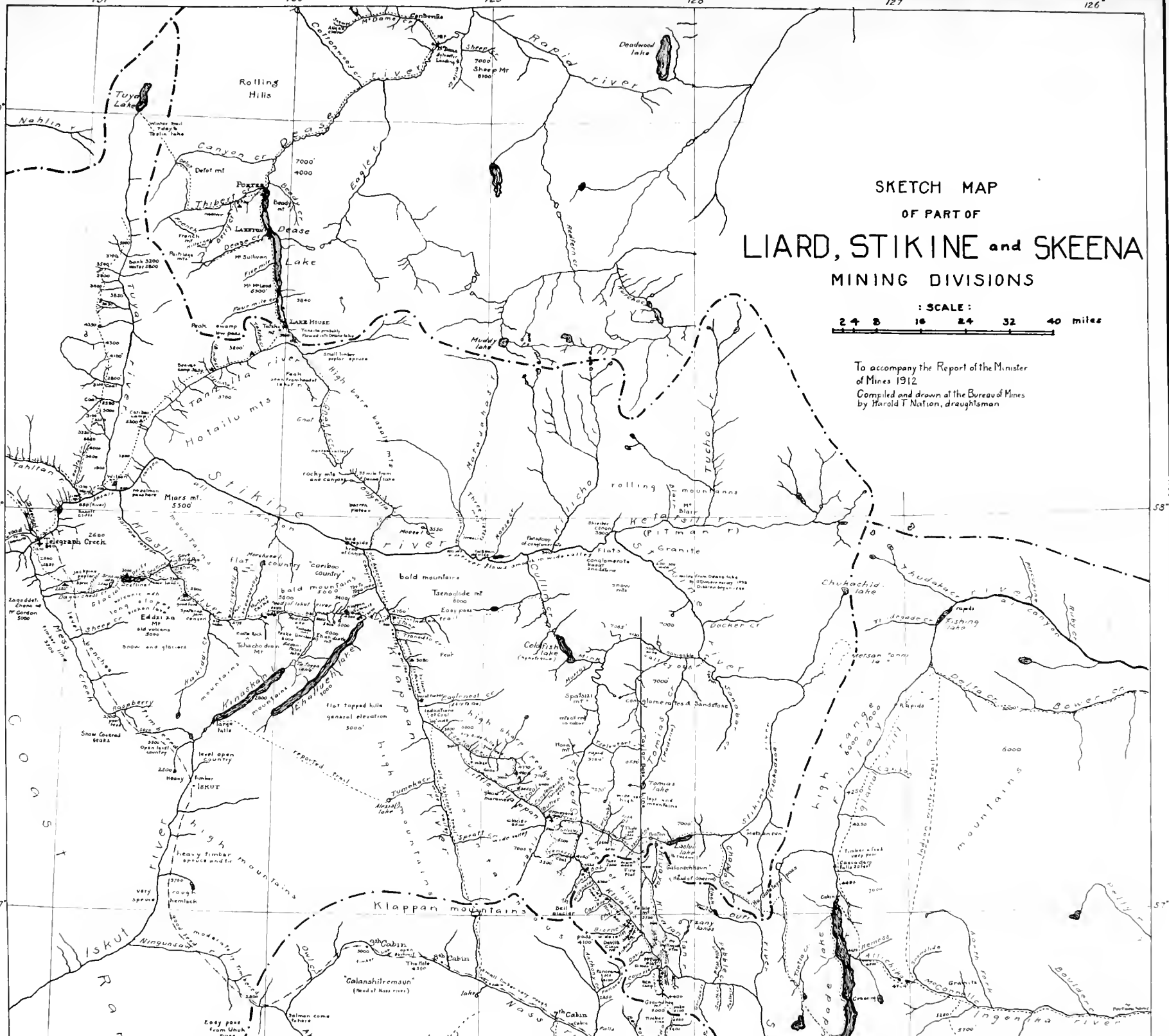
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SKETCH MAP
OF PART OF
LIARD, STIKINE and SKEENA
MINING DIVISIONS



To accompany the Report of the Minister
of Mines 1912
Compiled and drawn at the Bureau of Mines
by Harold T. Nation, draughtsman



TRIP OF INSPECTION TO EASTERN STATES.

VICTORIA, B.C., July 31st, 1912.

*The Honourable Sir Richard McBride, K.C.M.G.,
Minister of Mines, Victoria, B.C.*

SIR,—Having been delegated by you to attend the Fourth Annual Convention of the Mine Inspectors' Institute of the United States of America, held at Columbus, Ohio, June 17th to 21st, 1912; to visit the U.S. Bureau of Mines Testing Station at Pittsburg, Pa., for the purpose of ascertaining the methods employed in testing permitted explosives and noting their action in the presence of known quantities of gas and coal-dust; also to visit some of the representative bituminous-coal mines in the Pittsburg region and one in the State of Illinois, I have the honour to submit to you this report covering such observations.

The Convention of the Mine Inspectors' Institute was duly called to order in the Great Southern Hotel, Columbus, Ohio, on the morning of June 18th, by addresses of welcome from Mr. Long, representing Governor Judson Harmon, of Ohio, who was unavoidably absent from the city; the Honourable George J. Karb, Mayor of the city of Columbus, and Mr. Bassett, representing the Chamber of Commerce.

John Laing, President of the Mine Inspectors' Institute, then delivered his annual address and the various committees were appointed, after which the Convention adjourned until 2 p.m. After hearing the reports of the Secretary and Treasurer, the Convention got down to serious business.

A very able address was delivered by Dr. Joseph M. Holmes, Chief Director of the U.S. Bureau of Mines, Washington, D.C., on work for the prevention of mine accidents. This address brought out a general discussion on mine accidents and compensation for such, which proved very instructive to all. Much interest is being aroused on the subject of compensation to workmen in the United States, and I was called on for information on the workings of the British Columbia "Workmen's Compensation Act," which I explained to the best of my ability. The general consensus of opinion was that compensation for injury should be a tax on the industry, and constructed along lines where it would take the place of the "Employers' Liability Act," being so administered that whatever amount was fixed would find its way to those entitled to the compensation and not be dissipated in litigation.

The evening session brought out an excellent address by Thomas Moses, Superintendent of the Bunsen Coal Company of Danville, Illinois, and a former Mine Inspector of that State, on "Workmen's Compensation and Mine Discipline." Another splendid address was delivered by Dr. Clarence Hall, Explosives Engineer of the United States Testing Station, Pittsburg, Pa., on "Testing of Explosives and Detonating-caps," which proved very interesting and instructive. J. W. Paul, Engineer in charge of the Rescue-work of the U.S. Bureau of Mines at Pittsburg, delivered an address on "Mine Inspection." An exceedingly able and instructive address was given by Mr. Jeffrey, of the Jeffrey Manufacturing Company of Columbus, Ohio, on "Methods of Organizing Workmen and their Efficiency," including a description of a hospital at their plant which treated 12,000 cases in the year 1911.

The members of the Institute subsequently had the pleasure of visiting this factory as the guests of the Jeffrey Manufacturing Company, and witnessed the construction and manufacture of coal-cutting machines, electric locomotives, mine-fans, and, in fact, every kind of conveying and handling machinery known to the coal business, and also paid a visit to the hospital already mentioned. A surgeon and a trained nurse were on hand, and every accident to an employee,

no matter how trivial, was treated in this hospital. The functions of the hospital are not to provide accommodation for sick or injured employees, but solely for rendering first aid or treating wounds received whilst at work, and for looking after the health of the employees generally. This company does not lay any claims to philanthropy in this work, claiming that it is a business proposition pure and simple, and a good investment, not only in reducing compensation claims, but in obtaining a maximum efficiency from their employees.

WEDNESDAY MORNING'S SESSION.

Karl F. Schoew, Inspector from West Virginia, read a paper entitled "Quality and Quantity of Mine Air." This very able paper brought forth an extended discussion on what constituted a gaseous mine and the relative merits of the various means of humidifying the mine atmosphere; its effects on the different strata forming roof and floor; its effects on mine timber, on workmen under varying temperatures and conditions, and its effects on arresting or propagating explosions. This discussion lasted the entire day, and was finally closed to facilitate business and permit the programme of the Convention being carried out. A multitude of ideas were advanced, many being diametrically opposed to each other, and proving conclusively that no fixed rule or method can be laid down for determining the amount of humidity or means of applying it that will suit the ever-varying conditions which are met with in coal-mining in the different coalfields.

The members of the Institute were the guests of the city of Columbus on an automobile tour of the city, a visit to their water-filtration plant and to their garbage-disposal plant, which proved very interesting and instructive.

THURSDAY'S SESSION.

Thursday's session brought out a paper by Dr. J. J. Rutledge, Engineer of the U.S. Bureau of Mines, entitled "A Suggestion in regard to Coal-mine Inspection," in which it was proposed to cut out the personal elements and apply a method of inspection based on a percentage basis, of so many marks being deducted for certain specified deficiencies, or, in the words of the author, "reducing the inspection to a mathematical basis." This suggestion, while theoretically ideal, was deemed practically impossible.

A thoroughly practical and very able paper, entitled "Need for Better Discipline and Co-operation in Mining," was read by Charles H. Nesbit, Chief Inspector for Alabama, and embraced a great many ideas which this Department has been trying for some time to inculcate—namely, the co-operation of the Government officials with the mine officials, and last, but not least, the miners themselves, in the humanitarian work of reducing mine accidents.

P. J. Moore, of the Anthracite Inspection staff, Carbondale, Pa., read a practical paper entitled "Accidents from Falls of Roof and Coal in Anthracite Mines," which proved to be a very able paper.

FRIDAY'S SESSION.

Friday's session was devoted to business. The constitution of the Institute was amended to permit Inspectors from Canada to become members, and Robert Strachan, Inspector at Merritt, and the writer were elected to membership in the Institute.

The ballot being spread, it was found that the following named gentlemen were elected to office for the next year: President, Thomas K. Adams, Pennsylvania; 1st Vice-President, D. J. Roderick, Pennsylvania; 2nd Vice-President, Edward Flynn, Alabama; 3rd Vice-President, D. C. Botting, Washington; Treasurer, R. T. Rhys, Iowa; Secretary, J. W. Paul, Pennsylvania; Editor, J. T. Beard, New York.

Birmingham, Alabama, was chosen as the next place of meeting.

A very successful meeting was then adjourned.

The same evening I proceeded to Pittsburg, and on Saturday, through the courtesy of Dr. Hall, of the Bureau of Mines, I was shown over the Testing Station of the United States Government at Pittsburg. Owing to lack of funds very little work was being done, but the description of the various tests to which the various explosives are submitted, and the machinery employed, proved highly educational and most interesting.

That explosives used in coal-mining have been the cause of many—if not most—of the disastrous explosions which have occurred in the coal-mines of this and other countries, there can be little doubt. Any explosives intended for use in a coal-mine should be of such a nature as not to readily ignite explosive mixtures of gas or coal-dust. The loss of many thousands of lives in coal-mine disasters has stimulated, to a marked extent, research in regard to the preparation of explosives suitable for use in coal-mining. It has been found that every known explosive, if fired in a sufficiently large charge, will ignite an explosive gas mixture, but explosives have been found to differ widely in regard to the amount that can be fired without causing ignition.

Somewhat less than 1 oz. of ordinary black powder will readily cause the ignition of explosive gas mixtures, while certain other explosives in quantities as great as $2\frac{1}{2}$ lb., under conditions exactly similar to those used in testing the black powder with repeated trials, have invariably failed to cause ignition of the explosive mixtures.

It is to furnish information to the mining companies of explosives that will pass certain tests that the U.S. Bureau of Mines has established the Testing Station at Pittsburg.

The various powders furnished by the manufacturers are submitted to certain tests, and in the event of their passing the test they are placed on the "permissible list" for use in coal-mines. The powders are first submitted to analysis to determine the chemical composition of the explosive; they are then subjected to a series of tests.

The first test is the *Ballistic Pendulum*, which is used to determine the relative weights of the different explosives that when fired will produce equal deflections of the pendulum.

The Ballistic test being purely comparative, a standard explosive has to be selected with which to make comparisons. The standard explosive selected for this purpose is a dynamite of the following composition: Nitro-glycerine, 40 per cent.; sodium-nitrate, 44 per cent.; wood-pulp, 15 per cent.; calcium-carbonate, 1 per cent.

The quantity of this dynamite used in a standard charge is $\frac{1}{2}$ lb (227 grams), and is fired with a No. 6 detonator. The Ballistic apparatus consists of two parts—the cannon in which the charge is fired, and the pendulum, which receives the impact of the products of the explosion and of the stemming, the quantity of stemming used being always 1 lb. except for slow-burning explosives, when 2 lb. is used. The cannon is similar in dimensions and construction with the one used in the dust and gas gallery and with the one used in making the flame tests; it is fastened to a truck which runs on a track. The cannon is so placed that the axis of its bore is in line with that of the mortar or pendulum.

The pendulum consists of a 12-inch U.S. Army mortar, weighing 31,600 lb., and is hung between two concrete walls by steel rods passed through two cast-steel saddles and fitted over a steel beam resting on the concrete walls, the beam being fitted with nickel-steel knife-edges set in grooves to keep the edges covered with oil and protected from the weather. The extent of deflection of the pendulum when the charge is fired from the cannon is determined by an automatic recording device.

The cannon is loaded with a carefully weighed charge in which an electric detonator has been inserted and tamped, and the cannon is moved forward to within $\frac{1}{8}$ inch of the muzzle of the mortar and the charge exploded. Three trials of the standard explosive is made and the average swing noted; tentative trials of the explosive under test are then made until the charge gives a swing approximately to that of the average swing of the standard explosive. The results are then confirmed by three trial rounds of the explosive under test; if the average swing of these three rounds is within 0.2 inch of the average swing produced by the standard explosive, and if the three swings do not vary over 5 per cent., the trial is accepted as satisfactory. The weight of the explosive which will produce a swing exactly equal to that effected by the standard charge is then determined, and this unit charge is used in the tests to be made in the gas and dust gallery.

The gas and dust gallery consists of a cylinder 100 feet long and 6 feet in diameter, and is built of boiler-plate in fifteen sections, each section having a relief-door to provide a vent for the escaping gases, and each section is fitted with a plate-glass window to observe the progress of the flame. The gallery, or certain sections of it, can be filled with gases in known proportions to the air contained. The explosives are fired from a cannon embedded in concrete at the end of the gallery, into a mixture of air containing known percentages of gas and known quantities of coal-dust.

The results are noted from a gallery some distance away, in which is the electric-firing device, the gas-meter for determining the quantity of gas in the tunnel, etc. All explosives are subject to five tests.

Test 1.—Ten shots, each with a charge equal to $\frac{1}{2}$ lb. 40-per-cent. dynamite as determined by the Ballistic Pendulum, are fired in their original wrapper, tamped with 1 lb. of dry fireclay, at a gallery temperature of 77° Fahr., into a mixture of gas and air containing 8 per cent. of methane and ethane. If all ten shots fail to ignite the mixture, the explosive is considered to have passed the test.

Test 2.—Ten shots, each with a charge equal to $\frac{1}{2}$ lb. 40-per cent. dynamite as determined by the Ballistic Pendulum, are fired in their original wrappers, tamped with 1 lb. of dry fireclay, at a gallery temperature of 77° Fahr. into a mixture of gas and air containing 4 per cent. methane and ethane and 20 lb. of bituminous-coal dust, 100-mesh fine, from the Pittsburg bed, 18 lb. of which is placed on shelves laterally arranged along the first 20 feet of the gallery, and 20 lb. placed near the inlet of the mixing system in such a manner that all or part of the dust will be suspended in the first section of the gallery. An explosive is considered to have passed this test if all ten shots fail to ignite the mixture.

Test 3.—Ten shots, each with a charge equal to $\frac{1}{2}$ lb. 40-per-cent. dynamite as determined by the Ballistic Pendulum, are fired in their original wrapper, with 1 lb. of dry fireclay stemming, at a gallery temperature of 77° Fahr., into 40 lb. of bituminous-coal dust, 100-mesh fine, from the Pittsburg bed, 20 lb. of which is distributed uniformly on a horse placed in front of the cannon, and 20 lb. placed on shelves in sections 4, 5, and 6 of the tube. An explosive is considered to have passed this test if all the ten shots fail to ignite the mixture.

Test 4.—A limit charge is determined within 25 grams by firing charges in their original wrappers, unstemmed, at a gallery temperature of 77° Fahr., into a mixture of gas and air containing 4 per cent. of methane and ethane and 20 lb. of bituminous-coal dust, 100-mesh fine, from the Pittsburg bed, arranged in the same manner as in Test No. 2. The limit charge is repeated five times under the same conditions before being established.

Test 5.—Same as Test 4, except that 2 per cent. of methane and ethane is used instead of 4 per cent., and that one shot is fired instead of five.

The powder is then tested for rate of detonation. The rate of detonation is measured through a cartridge file 42 inches in length; in making the test the separate cartridges of the explosive have the paper cut from their ends to avoid the dampening effects of its folds, are placed end to end in a sheet-iron tube 42 inches long and either $1\frac{1}{2}$ or 2 inches in diameter, depending upon the diameter of the cartridges to be tested. Two copper wires leading from a Mettegang recorder are passed one meter (3.28 feet) apart through the cartridge file and securely fastened. The charge thus arranged is suspended horizontally in a pit and exploded by an electric detonator placed in one end of the cartridge file; the drum of the Mettegang recorder is rotated at the desired speed and the electric detonator is fired by an electric-firing device placed near the recorder. As the wire that passes through the cartridge files is broken, spots are formed on the smoke-covered drum of the recorder, the distance between the spots at a constant speed being proportional to the elapsed time between the breaking of the wires. When the peripheral speed of the drum is 43 meters (141 feet) per second, the smallest time interval which it is possible to record is $\frac{1}{4,300.000}$ part of a second, but with a distance between wires equal to 1 meter (3.28 feet), such refinement is unnecessary.

The rate of detonation, which is expressed in meters per second, is computed from the speed of the drum and the distance between the spark-points.

The flame test is used to record by photography the relative lengths and duration of the flame produced by the different explosives when they are detonated or fired under certain conditions. The test is based on the belief that the greater the length of flame that an explosive emits and the longer the duration of the flame, the more frequent are the chances that such a flame, when shot into a mine atmosphere, will ignite explosive mixtures of gas and air, or gas, coal-dust, and air.

In order that the lengths and durations of different flames may be compared, they must be measured from a common base-line; this measurement is accomplished by causing the explosion to take place at a certain fixed point, and then, by means of a camera, observing the flame at such a point that its apex is included in the field of view.

The principal features of the photographic device are: a rotating drum to which the sensitized photographic film is attached; a 220-volt motor regulated by a rheostat, by means of which the drum is revolved; a lens by which the rays of light from the flame are focused on the film; a semicircular shield in which a slit has been cut, which is placed in front of the lens; a shutter which excludes the light from the photographic box at all times except when the photograph is being taken; and a light-tight box in which all of these parts, except the motor, are enclosed.

The speed at which the motor revolves is ascertained by means of a tachometer which is calibrated to read directly in meters per second.

The impact-machine is used to determine the sensitiveness of explosives to explosion when they are struck with a known mass of steel moving at a known velocity, while the explosive tested rests on a steel surface. The charge used is 0.02 grams, which is placed on the steel surface and the hammer raised to a known elevation; the hammer is allowed to fall; if no explosion occurs, the weight, or hammer, is raised to successive heights until an explosion occurs.

The Bichel pressure-gauge is employed to determine the maximum that an explosive will exert if exploded or detonated in a space that it fills completely—as in a shot-hole in a mine. This apparatus also affords a means for the collection and examination, by chemical and physical methods, of the gases, liquid and solid products of the chemical reaction that takes place when the different explosives are fired within it.

The Trauzl lead block measures the comparative disruptive power of an explosive when fired under moderate confinement. In making the test, equal weights of different explosives are confined in boreholes of definite dimensions by means of a fixed quantity of stemming, and when thus confined are exploded by means of similar detonators. In this test, care is taken to have each factor alike, except the characters of the explosives which are being compared.

The measure of the test is the volume by which the cavity of the block is increased because of the pressure exerted by the explosion under the different quantities and firmness of the stemming.

These are the principal tests to which the explosives submitted are subjected before being placed on the "permissible list" of explosives for use in coal-mines.

The Bureau also has on hand a number of oxygen rescue apparatus of every type and make, and with which parties enter the gallery after explosions of gas and dust or gas, thus obtaining practice in similar conditions of atmosphere to those which prevail after an explosion in a mine.

There is also an apparatus for testing safety-lamps in known percentages of gas at known velocities; a device for testing electric and gasoline haulage motors in known percentages of gas and air, and a great many other devices that my limited time forbade me observing.

On Monday, through the courtesy of Mr. Sleederburg, manager of the Pittsburgh Coal Company, Mr. Harry Lewis, civil engineer, kindly conducted me through the Willock mine of the above company. This mine is on the famous Pittsburg bed, a coal of very high quality, about five feet in thickness; the shaft is about 50 feet in depth, the mode of working being pillar and stall, the coal being cut by machinery. The roof requires little timber; the seam is almost flat and very free from faults, and is what might be termed an ideal seam of coal; very little gas is given off and open lights are used everywhere.

On the afternoon of this day we drove from Willocks to Bruceton, and there visited the United States Government's experimental mine. Owing to lack of appropriations no experimental work was going on at the time of my visit, and for the same reason four of the Government mine-rescue cars had been called in and were at Bruceton. The superintendents of these cars were driving the main headings of the experimental mine. We went to the face of these headings and were shown the various chambers in the concrete-work for holding the instruments by which the Government hopes to record the velocities and pressures of the explosions during experiments.

The following day, again under the guidance of Mr. Lewis, we visited the Banning No. 2 mine of the Pittsburgh Coal Company, situated at Willset Junction on the Pittsburgh, Lake Shore & Erie Railroad. This mine adjoins the Darr mine, where a disastrous explosion occurred in December, 1907, in which 238 men lost their lives. This is a drift mine on the Wynesburg seam, which is about 8 feet thick, and was selected for examination because of its well-known gaseous nature. This seam is free from faults, outside of a few clay horsebacks, which are trifling in extent. The seams are almost flat, very regular, with a splendid roof requiring very little timber. The mine is ventilated by a Capell fan producing about 240,000 cubic feet of air a minute. The return currents showed no indications of gas on the Wolf safety-lamp. Haulage was done by endless rope and electric motors. The seam was an ideal one to work, and the conditions of the mine in general reflected great credit on the manager, Mr. Kelvington.

No rescue apparatus was kept at these individual mines, the Pittsburgh Coal Company having a central station at some other portion of the field.

Leaving Pittsburg the same night, I proceeded to Springfield, Illinois, where, through the courtesy of Mr. Martin Bolt, the Secretary of the State Mining Board for the State of Illinois, and District Inspector Thomas P. Back, I was taken through the Divernon mine of the Madison Coal Company at Divernon.

This is a shaft mine between 300 and 400 feet in depth, and is on No. 7 seam of the Illinois series. The coal is 8 feet in thickness and is worked pillar and stall in panel system. The roof is one of the best I have ever seen in a coal-mine, the shaft-bottom being 20 feet in width, with no support of any kind to the roof. The roadways are thus wide and high and very little timber used. The seam is flat and regular, coal all mined by machines, and haulage done by electric motors. This is truly an ideal mining condition. Concrete is used around the shaft-bottom, stables, and fire-stations very extensively. A few sets of Draeger oxygen apparatus are kept at this mine, but no station for training, the men going to the State station at Springfield for such training.

I next visited the State Rescue Station in Springfield, where Mr. Richard Newsam, manager of the Illinois Rescue Station, very kindly showed me through the station. This station is a large one, with not only work-room, smoke-room, and observation-room, but contains reading-room, dining-room, kitchen, bath-room, and accommodation for sleeping and boarding of the men who come to take a course in the rescue-work.

The general appearance of the station was neat and attractive, and generally well-kept, but the care of the apparatus leaves room for some improvement, not only at this station, but at the station of the U.S. Government at Pittsburg and on the U.S. mine-rescue cars.

SUMMARY.

The meeting of the Inspectors' Institute, in papers read, addresses delivered, and general debate on these, brought out a large and varied amount of information that can only be obtained by the meeting together of so many men whose aims and objects are similar, although working under varied and different conditions, not only of the mines and field in their respective inspectorates, but under laws differing as widely as their conditions. Yet, withal, the exchange of opinions and views and the mutual intercourse must of necessity stimulate and enthuse every one who was present to greater effort to attain the ideal we are all seeking.

The work which the U.S. Government is carrying out through the Bureau of Mines under the very able directorship of Dr. Joseph M. Holmes must be of incalculable benefit to the mining industry of the United States, and our own Federal Government might well imitate this great work for the benefit of the mining industry in Canada: through the research-work carried on by this Bureau, many of the inexplicable things confronting the practical manager and miner are made plain and intelligible, and they are thus enabled to better understand and safeguard themselves in their daily operations.

The general discipline and individual efforts put forth by the various companies for the purpose of minimizing accidents were not in advance of those put forth by the more progressive coal companies in this Province.

Geologically, nature has been kinder to them than to us, the seams being nearly all flat and uniformly free from faults and disturbances, while ours are contorted and dislocated in every conceivable form, thus accounting for the high percentage of accidents from haulage and mine-cars in this Province.

A driver with one mule, in either the Pittsburg region or the Illinois field, will pull from 100 to 125 tons of coal a day, while here, under our much disturbed conditions, a driver with one mule will gather only from 25 to 30 tons per day, as this up-hill and down-dale condition makes necessary much spragging of mine-cars which is the large factor in mine-car accidents with us.

My observations of the mine-rescue apparatus of the U.S. Government at their Pittsburg station and in their rescue-cars, also the apparatus in the station of the State of Illinois, convinced me that their apparatus was not so well taken care of as the apparatus in the several stations in this Province.

Notwithstanding the splendid research-work of the Bureau of Mines *re* explosives suitable for use in coal-mines, and the generally accepted idea of the dangers attending the use of ordinary black powder in blasting coal, much of this powder is still used in the production of coal in the United States.

The use of exhaust-steam for the humidifying of mine atmospheres and allaying dust is much used in certain fields in the United States; its use is only applicable under certain conditions—namely, where the roof material is of a nature which is not affected by the steam, and in non-gaseous mines where the blower-fan is used. This method could not be used with an exhaust system of ventilation, which is necessary in a gaseous mine; the exhaust-steam in the atmosphere would render the haulage-roads unworkable, and would create an evil which was greater than that which we were trying to allay.

Exhaust-steam used in the form of radiators in the mine intake, raising the temperature of the intake air to 10 degrees above the normal mine atmosphere, and then humidifying the air by means of a series of sprays, appeals to one as a system which would overcome the objections to the exhaust-steam in the air, and could be used either under the blowing or exhaust type of fan, and generally is much favoured.

I have to thank, for courtesy extended, the Deputy Minister of Mines; Provincial Mineralogist and E. Jacobs for letters of introduction; the inspection staff of Ohio; Dr. Holmes and staff of the U.S. Bureau of Mines; Harry E. Metcalf and Harry J. Lewis, of Pittsburg; Martin Bolt and Thomas P. Back, of the Illinois Inspection Department.

Respectfully submitted.

THOMAS GRAHAM,

Chief Inspector of Mines.

REPORT ON EXPLOSION, DIAMOND VALE COLLIERY, NICOLA COALFIELD.

REPORT OF WM. FLEET ROBERTSON, PROVINCIAL MINERALOGIST.

VICTORIA, B.C., March 29th, 1912.

*The Honourable Minister of Mines,
Victoria, B.C.*

DEAR SIR,—In accordance with instructions received from the Deputy Minister, I proceeded on the 13th instant to Merritt, arriving there on the 14th, to investigate, with the Chief Inspector of Mines, the explosion which had occurred there on the 7th instant in the No. 3 Colliery of the Diamond Vale Coal Company, whereby seven men were killed.

I remained in Merritt for the inquest, and, according to instructions, gave my evidence at the inquest, practically confirming that given by the Chief Inspector.

The Diamond Vale Colliery Company holds a large area of coal lands extending from the Coldwater river, and the lands of the Nicola Valley Coal and Coke Company, across the flats to the Nicola river, a distance of about two miles in a straight line.



Diamond Vale Colliery—No. 3 Slope and Tipple.



Diamond Vale Colliery—showing Fun as thrown by Explosion.

The first prospecting-work of the Diamond Vale Company was done in about 1901 and 1902, when it attempted to sink a couple of shafts through the surface gravels near the Cold-water river; these endeavours were, however, unsuccessful owing to the amount of water circulating through the gravels.

The next development was started on the other side of the property near the Nicola river and adjacent to the tracks of the Canadian Pacific Railway, between Merritt and Nicola. Here the coal was found outcropping on a rolling hill about 100 feet above the railway and dipping to the south, into the hill, at an angle of from 30 to 40 degrees; the thickness of the seam being from 4 to 5 feet of coal, with, contained in the seam, a couple of sandstone partings of 4 or 5 inches thick.

The roof and pavement of the seam are both composed of unusually hard sandstone, which forms a splendid roof to the workings and requires very little timbering. Immediately above the coal there is usually from 6 to 10 inches of sandy shale below the regular sandstone roof.

The roof-stone is frequently cross-fissured, which often permits of the dropping-down of blocks of the sandstone roof, unless these detached pieces are caught in time by suitable timbers.

The density and character of the roof render it exceedingly improbable that gas would be contained therein or be liberated when a fall of roof occurs, which deduction is borne out by the testimony of the manager, Benjamin Browitt, at the inquest, that gas was not liberated by such falls of roof.

The coal is bituminous, of good quality, and fairly hard and firm, having an analysis of about: Moisture, 1.4; V.C.M., 31.9; fixed carbon, 61.4; ash, 5.3. Ratio of V.C.M. to F.C., 1.92.

The present development of this No. 3 Colliery consists of a slope and counter-slope driven down on the pitch of the seam, the former being now down over 500 feet at an angle of between 35 and 40 degrees.

From the slope, at a distance of about 300 feet down, a level has been driven to the east for about 700 feet—known as the No. 1 East level. At about 350 feet down the slope a level has been run off to the west for about 550 feet—known as No. 1 West level.

The method of working the coal from these levels has been by putting up to the rise a series of double stalls each 36 feet wide, with a pillar of coal of 36 feet left between.

These double stalls are opened from the level by a pair of chutes, each about 12 feet wide, leaving a solid pillar of coal of 12 feet between them; this pillar remains intact for a distance from the level of from 20 to 25 feet, when the chutes are connected forming the stall, which thereafter is carried up for the full width of 36 feet, a pack-wall, composed of the parting stone and waste, being carried up the middle of the stall all the way; this parting wall serving as a permanent brattice or partition, the air circulating up one side of it and down the other. Crosscuts are run between the stalls at a distance of from 30 to 40 feet above the level.

From the No. 1 West level there was already up a counter-slope and four double stalls, while a further pair of chutes had been started which would soon have been united to form another double stall.

From the No. 1 East level, besides the counter-slope, there were seven rooms driven up; the first three rooms were up their full distance, about 300 feet, and were stopped, as they had reached surface coal. These stalls are numbered from the slope outward, by the chutes; chutes Nos. 1 and 2 leading to first stall, chutes Nos. 2 and 3 to second stall, and so forth.

It was shown there was no survey or plan of the mine since June, 1910, which was so long ago as to be now of no significance. The blue-print accompanying this report was prepared by the draughtsmen of the Nicola Valley Coal and Coke Company from dimensions and figures supplied, after the explosion, by Benjamin Browitt, manager, and Mr. Browitt turned it in to the Coroner's inquest as a true representation of the mine at this date.

Upon this plan, at the East level, the place where each dead body was found is marked by an X and a number, while a corresponding number in a circle shows the working-place of each man. Every man in No. 1 East, or stall off from it, was killed, numbering seven men. Their names were as follows: (1) John Hogg, pusher; (2) Henry Grimes, fireboss; (3) John Templeton, miner; (4) John Pattie, miner; (5) Frank Kallia, miner (Kelly on plan); (6) William Baxter, miner; (7) William Hurd, miner.

In the West level workings there were eleven men, who escaped uninjured with the exception of two, who happened to be at the junction of the level and slope, and these were somewhat burned, but not dangerously.

The explosion had very little effect on this side of the mine, in some cases not even blowing out the naked lights.

The intake air was brought down the slope and split, a part going to each side, so that each level was on a separate split of fresh air, and, since the explosion had little effect on the west side, and no lives were lost there, and all the damage was done on the east side, therefore this examination was confined to the east side of the mine and to the slope.

The mine had been opened up primarily to prospect the ground only, rather than as a producing colliery, although the coal taken out in development-work was sold to assist in paying expenses.

These conditions had existed for a year or two, and apparently continued up to November of 1911, up to which time the amount of coal mined had been about 200 tons a month, and the number of men employed underground less than ten.

In December, however, the general shortage of coal in the Province caused a demand to which this company responded, and in December the output was raised to 800 tons for that month and was the same for January, while for February it rose to 1,200 tons and the number of men employed underground increased to twenty.

The surface equipment of the mine consisted of a very fair and efficient tippie, a locomotive-firebox boiler, carrying steam to 100 lb. pressure, housed in a rough temporary shed.

This boiler supplied steam to a small friction-clutch hoist, standing in the open, to one side of the line of the slope, which was used for hoisting and was evidently capable of hoisting a trip of three loaded cars.

Steam was also supplied to a ventilating-fan—a rather dilapidated self-contained machine, to which, before the explosion, there had been attached a direct-connected vertical engine.

This fan, from the Inspectors' reports, was, under existing conditions, capable of producing ventilation of from 7,000 to 10,000 cubic feet of air, depending upon how fast it was run, quite sufficient for the mine, if the air-current were properly conducted through the workings.

This fan was set in the upcast air-tunnel, its outlet opening being about 3 square feet in area, the remainder of the tunnel being, consequently, boarded up.

The position in which the fan was set was in direct violation of General Rule 1 of the "Coal-mines Regulation Act, 1911," which came into force on March 1st, 1911; but the fan had been so placed before this Act came into force, and the former Act did not contain any

such provision as to placing the fan to one side of the line of the tunnel or shaft, although it had always been regarded as good mining practice so to do.

As the property had, until December last, only been operated as prospecting workings, it does not appear that the Inspectors, since the coming into force of the 1911 Act, had ever made a direct demand on the management to alter the position of the fan.

In my opinion, the position of the fan, although contrary to the Act, was in no sense a contributory cause to the accident, nor in this case was it responsible for any greater loss of life, as all the victims were killed practically instantly.

The mine was in charge of Benjamin Browitt, who was the holder of a first-class certificate as manager. As far as the Act requires, the mine, before December last, might have been under the charge of a holder of a third-class certificate, and, since December, of a holder of a second-class certificate, so that, as far as a certificate was concerned, Mr. Browitt was fully qualified, and no other certificated official would have been required had Mr. Browitt personally attended to the duties of the position, since he might have acted as overman or fireboss.

It appears, however, that Mr. Browitt did not personally attend to the duties of fireboss, but engaged a man—Harry Grimes—who was one of those killed and who did not hold any British Columbia certificate, to perform the duties of fireboss, and that, for about a year back, Mr. Grimes had each morning examined the mine, under terms of General Rules 4 or 5, and passed the workmen into the mine each morning at 8 a.m., entering his report in the "book kept at the mine for that purpose."

These reports seem to have been regularly made, with the exception of an interval from February 5th, 1912, when the old book was filled, until March 2nd, when a new book was provided by Mr. Browitt; for this period there are no written reports, but it would appear, however, from the evidence, that the daily examinations were regularly made by Grimes and the men each day passed into their work.

Evidence at the inquest, however, showed that Grimes only got to the mine at 7 a.m., and that between that time and 8 o'clock, when the men came on shift, he was supposed, under the terms of General Rules 4 and 5, to examine, with a locked safety-lamp, "every working-place in the mine and the roadways leading thereto." This, in my opinion, after examining the mine, was a physical impossibility for any one to do in the time. It was said, though not brought out under oath, at the inquest, that Grimes held Old Country certificates of competency, and the evidence of the miners who survived was that he appeared to be sufficiently experienced and competent and did perform the required duties.

There was only one regular shift working in the mine—from 8 a.m. to 4 p.m.—although a couple of men were employed on the afternoon shift—from 4 p.m. until midnight—in sinking the slope deeper. There was an engineer on the morning shift and another on the afternoon shift on the surface, during which time the fan was at least nominally in operation, but the fan was regularly shut down from midnight till 7 o'clock in the morning.

The shutting-down of the fan for seven or more hours immediately preceding the oncoming of the morning shift—the shift on which the explosion took place—was, in my opinion, a very important factor in causing the explosion, if it was not the direct cause of the explosion, by allowing an accumulation of gas in Nos. 13 and 14 chutes.

The explosion took place about 9.45 a.m. on the morning of March 7th, 1912.

COURSE OF VENTILATING AIR-CURRENT.

The ventilating air-current came down the slope and the split for the East level, travelled along that level to No. 14 chute, about 150 feet from the face of the level.

It then went up No. 14 stall, then by a crosscut at the top of No. 14, some 30 feet from the level, to No. 13 chute, down which it followed to the level, along which it was conducted, behind bratticing-cloth, to the bottom of No. 12 chute. Thence it followed up No. 12 and down No. 11 to a crosscut some 30 to 40 feet from the level, by which it crossed to No. 10; thence up the even-numbered chutes and down the odd-numbered chutes until it finally reached the slope-counter by a crosscut some 30 or 40 feet above the level, and thence to the fan.

The bottoms of all the chutes were nominally stopped, but, as coal had to come down through these stoppings and men and timber go through, there was undoubtedly such a heavy leakage of air that but a small portion of the ventilating-current got as far along the tunnel as No. 14 chute.

Each of these stalls thus formed an inverted U, at an angle of about 40 degrees, down which any light explosive gas formed had to be pulled down, a matter difficult at any time and calling for a current of air of considerable velocity; whereas a series of crosscuts across the heads of the rooms, each only 36 feet long and in coal, would have allowed any gas to go by its own lighter weight along these and into the return airway of counter-slope; any dust produced in the chutes following the same course.

The force of this procedure is so manifest, when looking at a plan of the mine, that it must have been apparent to any mine manager who had ever seen a plan of the mine, and I must assume that Mr. Browitt would have recognized this had he ever had a plan or sketch of the mine made. The plan herewith was only made *after* the explosion, and the mine-plan prior to this was practically non-existent, despite section 80 of the Act, which demands that plans shall be kept up to within three months of date.

The neglect on the part of the management in not keeping a proper mine-plan, in my opinion, was a contributory cause of the accident.

EVIDENCE OF GAS BEING PRESENT IN MINE.

The fireboss's report-book shows that gas was reported upon on several occasions in various stalls on both the East and West levels within the last six months, and there was evidence given at the inquest of two or three men having been slightly burned by ignited gas, although it does not appear that the gas occurred in any great quantity, and with proper ventilation would have been harmless.

On the morning of the accident (the 7th inst.) the fireboss was killed before he got out of the mine, so there is no entry in the report-book, but the evidence of the survivors is to the effect that Grimes chalked on a board at the entrance of No. 1 East level that all places on the West level were "clear," and that he told the men of the East level that all their places were "clear" and in order, with the exception of Pattia and Kallia, who worked in chutes Nos. 13 and 14 respectively. These men he told to wait and that he would go in with them, and he provided them each with safety-lamps, the inference being, according to mining customs, that there was standing gas in their places.

That gas was liable to occur there is evidenced by the fact that, since the explosion, these two chutes have been standing full of gas to a point some feet below the crosscut, and the manager has been unable to move it out.

The mine was worked entirely by open lights—the company having in its possession only two safety-lamps, and these were used, evidently, only for gas-testing purposes.

These two safety-lamps were found, after the explosion, hanging on nails, about 7 feet up chutes 13 and 14 respectively, in such a position as to preclude the possibility of their having been, immediately prior, in use either for testing purposes or for light.

These lamps (Wolf) were found to be in perfect order and uninjured, although in the hottest part of the explosion.

INITIAL POINT OF THE EXPLOSION.

The initial point of the explosion was, without doubt, in rooms Nos. 13 or 14, East level (these two are practically one place), as indicated by the condition of the mine afterwards, and I am inclined to believe, from contributory evidence, that it originated in chute 13, as I have stated further on in this report.

EVIDENCES OF DIRECTION OF INTENSITY OF FORCE.

The evidences are that there was no great intensity of force, but rather that it was a small explosion in Nos. 13 and 14 of gas very much below its maximum explosive point and much diluted by air, which, travelling outwards, met with an amount of dust in suspension in the atmosphere in chutes Nos. 9, 7, and 6, the only chutes where coal was being slid down, on an angle of 40 degrees to the level below.

The level itself was decidedly wet underfoot, whereas the freshly mined coal in the stalls produced considerable dust, and the fact that the chutes were all nearly empty would cause the coal mined to slide down the chutes with great velocity, so causing an unusual and unnecessary amount of dust.

The stoppings at the bottoms of all the chutes were found on the level, which would indicate a major force occurring above the levels, but this evidence is not conclusive, as the stoppings were flimsy structures of props and 1-inch boards, above which were piled waste and muck; and on an angle as steep as 40 degrees, should a force, in any direction, disturb the stoppings, the weight of the material piled above them would have brought everything down on to the level.

Along the level, several props, so situated as not to be affected by anything sliding down the chutes, were found to have been moved towards the mouth of the level; this was particularly noticeable as approaching No. 13 chute from No. 8 chute.

The roof of the level is so good that very few props were required, particularly near the mouth.

At the mouth of the East level, a loaded car and a man—J. Hogg—who was cleaning a switch there, were blown across the slope and rolled down it.

In the slope, the overcast from the west side to the return airway, a flimsy structure of boards, was completely demolished, while at the mouth of the upcast, at the surface, the fan and stopping were blown outwards, but with comparatively little force.

These latter occurrences indicate only the pressure outwards from the east side of the mine, but do not locate where in that side the explosion took place.

In the East level, the bratticing-cloth, which had extended from the foot of No. 12 chute to the foot of No. 13, was afterwards found in the level between chutes Nos. 10 and 11, showing conclusively a force from No. 13 outwards and probably from 13 and 14 downwards on to the level.

This is considered strong evidence of an explosion in 13 and 14, and, as there was only one explosion, it must have originated there.

The four bodies found in the level were all found flat, face downwards and head outwards, with hands above their heads, except (5) Kallia, who had been crawling over some debris.

It was found that each of the bodies was *on top* of the debris from the chutes and stoppings, and it was therefore evident the men lived long enough to run some distance after the explosion, which therefore could not have been very severe.

The bodies were all more or less burned, but Pattie's was more extensively burned than the rest.

The doctor's evidence was to the effect that all these men were killed by carbon-monoxide poisoning, but I believe he came to this conclusion not from pathological tests.

WHERE EVIDENCES OF HEATING OR COKING WAS FOUND.

Coking of dust on the posts was found some 40 feet in on the level past chute 14. This dust analysed as follows:—

Moisture.....	2.5
V.C.M.	13.0
F.C.	46.7
Ash.....	37.8
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Having a ratio of V.C.M. to F.C. of.....	3.6

The normal analysis of coal from here was on a clear piece of coal:—

Moisture.....	1.4
V.C.M.	31.9
Fixed carbon.....	61.4
Ash.....	5.3
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Ratio.....	1.92

The analysis of the fine dirt and coal from the bottom of the chutes here was:—

Moisture.....	2.3
V.C.M.	28.2
F.C.	48.1
Ash.....	21.4
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Having a ratio of V.C.M. to F.C. of..... 1.705

There was some coking at the head of chutes Nos. 13 and 14 and on props, evidenced by analyses:—

	No. 6.	No. 7.
Moisture.....	1.9	2.2
Ash.....	28.5	23.4
V.C.M.	22.3	20.6
F.C.	47.3	53.8
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Ratio.....	2.12	2.56

The most intense coking seen in the mine was in chute 9, about 100 feet from the top, where it extended from top to bottom of props, diminishing in quantity both up and down the chute. Analyses of coked dust from posts here gave:—

Moisture.....	2.0
V.C.M.	21.4
F.C.	58.6
Ash.....	18.0
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Ratio.....	2.74

THEORY AS TO CAUSE OF EXPLOSION.

From the facts I was personally able to see and from the sworn evidence at the inquest, I have formed the following theory as to the cause of the explosion, as being, in my opinion, the most probable :—

Through the stopping of the fan for eight hours prior to the oncoming of the morning shift on March 7th, explosive gas had accumulated in the upper parts of chutes 13 and 14.

The miners Pattie and Kallia had been warned of it; they were given safety-lamps to test for it, which they probably did and found gas there; they hung their safety-lamps part way up the chutes, and the evidence shows that they each had that morning loaded two car-loads of coal from the level at the bottom of their places.

About twenty-five minutes before the explosion, the fireboss Grimes told Henry Hogg, the rope-rider on the slope, who so testified, to tell the engineer to "*speed up the fan*"—to thereby cause a greater ventilating-current.

A few minutes before the explosion—so the same witness said—he saw Pattie and Grimes at the mouth of No. 1 East level. "Pattie was roaring for cars," and Grimes ordered an empty trip to be run into the East level.

The fan had been speeded up, which, by the increased air-current, would bring the gas standing at the head of Nos. 13 and 14 chutes down No. 13 to the level, behind the bratticing, on its way out. About this time Pattie was on his way back to his place. He and every one else in the mine were using naked lights. Pattie entered his place by passing under the brattice with his naked light, and would be just about in time to meet the gas being swept out of Nos. 13 and 14 by the increased air-current and would surely ignite it, causing an explosion, not violent, but enough to burn them all.

The fire would follow along the return airway, the air in which would contain gas just previously carried out from Nos. 13 and 14, leaving little or no evidence of heat until it arrived at chute No. 9, the first chute, on its way, where any one had been working that morning, and which would therefore have dust in suspension in the air.

The evidence is that Templeton, who worked here, had loaded coal that morning and had just come down out of his place to the level—probably for timber, as his roof was faulty.

The gas flame—or light explosion—meeting the dust in chute 9 would be greatly augmented, creating a second explosion there, which would account for a very heavy fall of roof-rock, completely across the face of chutes 9 and 10, which took place after the explosion.

This revived and augmented explosion would pass on through chutes 8 and 7, but leave no trace there, as there was probably no dust in suspension, since Baxter (6) was not up his stall and had not loaded out any cars of coal that morning.

Continuing to chutes 6 and 5, it would again meet with some dust in suspension, since Hurd (7) was working there and had sent out two car-loads of coal that morning; this would again augment the explosion, causing a sudden expansion which destroyed the pack-wall between chutes 6 and 5, as was found to be the case, and also leave evidence of heat in the place.

The augmented explosions in chutes 5 and 6 and 8 and 9 would account for the stoppings at the foot of the chutes being blown on to the levels.

The original explosion in chutes 13 and 14 would expand also into the dead end of the level, and through being so heated would, in its back-lash, be apt to form a coating of dust on the props there, which was found to be the case.

* The above theory seems to be intact, since it accounts for all the known facts as to where evidences of heat was found, etc., and is not in conflict with any fact known to me.

I am, sir,

Yours truly,

W. F. ROBERTSON,

Provincial Mineralogist.

REPORT OF THOMAS GRAHAM, CHIEF INSPECTOR OF MINES.

VICTORIA, B.C., April 23rd, 1912.

*The Honourable Minister of Mines,
Victoria, B.C.*

DEAR SIR,—I have the honour to submit to you my report of the explosion which occurred in No. 3 slope of the Diamond Vale Collieries, Limited, Merritt, B.C., on March 7th, 1912, and in which seven men were killed.

Leaving Victoria February 14th, on an inspection tour of the coal-mines in the Crowsnest pass, I was in Corbin, the most easterly coal-mining town in the Province, on March 7th and 8th. On Friday, the 8th, at 3 p.m., I received a telegram from Mr. Tolmie, Deputy Minister of Mines, informing me that an explosion had occurred in the No. 3 slope, Diamond Vale Colliery.

I left Corbin that evening, making connections at McGillivray with the C.P.R. eastbound train for Calgary, Alta., and thence by the C.P.R. main line to Spence's Bridge and Merritt, where I arrived on Sunday night, March 10th, this being twenty-four hours earlier than I could have arrived by either of the Western routes.

On arrival at Merritt, I found Inspector Morgan had reached there on the night of the 8th, to do which it had been necessary for him to cross the Gulf of Georgia in a gasoline-launch, a trip that a much younger man might have hesitated to undertake, and reflects great credit on this official.

The mine is owned and operated by the Diamond Vale Collieries, Limited, and is situated on the Nicola Valley branch of the C.P.R., one and a quarter miles east of Merritt.

The coal is bituminous, of fairly good quality, being firm, and having an analysis as follows: Moisture, 1.4; V.C.M., 31.9; F.C., 61.1; Ash, 5.3. Ratio of V.C.M. to F.C., 1.92.

The roof and floor being a hard, sandy shale, it required very little timber, the roof-shale for about 3 feet in thickness, sometimes from fissures or slicken-sides, dropping from the main sandstones, which formed the main overlying strata.

The mine is opened by a pair of slopes driven on the coal-seam; the course of the slopes is S. 5° W., and to the full dip, which varies from 30 to 50 degrees, the main slope being down 500 feet.

From a point 300 feet down this slope a level has been driven 700 feet to the east, and is known as the No. 1 East level, and from a point 400 feet down a level has been driven west, known as No. 1 West level. The counter-slope was only connected as far as No. 1 East level, a second lift being carried up from farther down the slope, but was not connected up to the No. 1 East level.

The mode of working this seam, which is about 4.5 to 5 feet thick, with two bands of sandstone each 6 inches in thickness, was by double breasts, turned off the levels to the rise, 36 feet wide, with 36-foot pillar between. These breasts had two openings off the level, 10 feet wide, and were carried up the pitch 25 feet, and then connected, making the 36-foot breast, thus leaving a centre pillar along the level; from this centre pillar a pack-wall of the refuse from the seam was carried up the centre of each double breast, and formed a permanent brattice, the coal being sent down each side of this pack-wall to the gangway or level below. A line of crosscuts was run between the breasts about 40 feet from the level, there being no counter-level.

From the No. 1 East level inside the counter-slope there were seven double breasts, the level extending about 150 feet beyond the last chute No. 14.

From the No. 1 West level inside the counter there were four double breasts and two necks being driven to make a fifth double breast. These, with the counter-slope, formed all the workings that were operated on the morning shift, the main slope being worked on the afternoon shift.

On the East level the first two breasts were up to the crop coal and so were finished; the others were being worked, two men in a breast, and all were numbered, by the chutes, from the slope inbye.

From the West level and counter-slope eight men escaped uninjured and two were burned, although not seriously. All the men working in No. 1 East level were killed. The position where each body was found is marked, on the blue-print attached, by an X and a number, while a circle, with a corresponding number inside, marks the place where each man worked. This plan was made after the explosion from measurements furnished by Benjamin Browitt, manager, to Mr. Daniels, the draughtsman of the Nicola Valley Coal and Coke Company. No survey of the mine had been made since June, 1910, and this blue-print is only a representation of the mine at the time of the explosion, and as such was turned in by the management at the Coroner's inquest.

The names of the men killed were: (1) John Hogg, pusher; (2) Henry J. Grimes, fireboss; (3) John Templeton, miner; (4) John Pattie, miner; (5) Frank Kallia, miner; (6) William Baxter, miner; (7) William Hurd, miner.

The explosion had no effect on the West level, further than to knock down the canvas brattice at the mouth of the level, where Harry Hogg, rope-rider, and Ralph Kilestro, pusher (the two men who were burned), were at the time of the explosion; this section can therefore be entirely eliminated when taking into consideration the point of origin of the explosion and its effects.

The surface equipment consisted of a tippie, small, but sufficient for the work being done; a small locomotive-firebox boiler, carrying 100 lb. steam-pressure, which furnished steam to run a small hoist, used to raise the coal from the slope; a pump at No. 1 West level, and a small fan, which had originally been driven direct, but is now being run by a belt from a small vertical engine. Both fan and engine were set inside the mouth of the return airway; the fan was exhausting and the mouth of the drift was boarded up, leaving an opening for the fan-discharge of about 9 square feet.

The capacity of this fan, according to the reports of the Inspectors, was from 7,000 to 10,000 cubic feet of air a minute, varying with the speed at which the fan was run, this quantity of air being ample for the requirements of the mine, provided it was properly conducted.

The position of the fan was not in accordance with the terms of General Rule 1 of the "Coal-mines Regulation Act, 1911." However, this fan had been so placed before the coming into force of the provision requiring the fan to be placed to one side of the line of the airway or shaft, although it never has been regarded as good mining practice to place a fan as this one was placed.

As the operations had been practically only exploratory, no demand had been made on the management to change the location of the fan; but its position, although not in accord with the Act, was in no way contributory to the explosion, and, although blown from its position by the explosion, it in no way was responsible for any additional loss of life, as the victims were all killed practically instantly.

The mine had been opened here for the purpose of proving the continuity of the seam and to supply the necessary information for an intelligent opening of the field.

The operations had been conducted in a haphazard manner for two or three years, sometimes working and sometimes being practically closed down, the number of men employed fluctuating with the varying ideas of the management.

In December, 1911, the tonnage was increased to 800 tons; in January of this year it was also 800 tons, and in February reached 1,200 tons and about twenty men were employed. On the morning of the explosion seventeen men were employed underground.

The mine was under the management of Benjamin Browitt, who was registered as the holder of a first-class certificate, according to section 34 (c) of the "Coal-mines Regulation Act." Previous to December, 1911, this mine might legally have been operated under a man with a third-class certificate, and since that date by a person holding a second-class certificate. Mr. Browitt's certificate thus qualified him to perform all the duties at this mine, and no other certificated persons were required, provided Mr. Browitt had personally made the examinations required by General Rules 4 and 5 of the "Coal-mines Regulation Act."

It would appear from the evidence given at the inquest, and from the fireboss's report-books of inspection kept at the mine, that Mr. Browitt had not personally made these examinations, but had delegated these duties to Henry J. Grimes, who was one of the victims of the explosion, and who was not the holder of a certificate of competency, under the "Coal-mines Regulation Act," entitling him to perform such duties.

From November 10th, 1910, until the explosion, Henry J. Grimes had acted in the capacity of fireboss, entering his reports daily in the book kept at the mine for that purpose.

These reports were made regularly, with the exception of from February 5th, 1912, to March 2nd, 1912. It would appear that the book used prior to February 5th was filled on that date, and evidently a new one had not been furnished until March 2nd, 1912. However, from the evidence at the inquest, Grimes had made his examinations and passed in the men each morning by verbal report. No report appears on the book for March 7th, the morning of the explosion, but evidence at the inquest showed that Grimes had reported the No. 1 West level as clear, this report being on a board at the entrance to No. 1 East level; the evidence further showed that when the men working in the No. 1 West level went to work, Grimes was still engaged in making his examination of No. 1 East level, the men of the East level remaining on the siding until he reported.

The morning shift worked from 8 a.m. to 4 p.m., and, from evidence given at the inquest, Grimes usually went into the mine at 7 a.m., and between this time and 8 a.m., when the work started, he was supposed to examine "every working-place in the mine and the roadways leading thereto," in terms of General Rules 4 and 5. This, from my knowledge of the mine and the labour involved climbing the chutes, I believe could not be done in the time above stated.

As already stated, only the main slope was worked on the afternoon shift, and after midnight no one worked in or about the mine, hence the fan was not operated from midnight until 7 a.m. This closing-down of the ventilating apparatus for from seven to eight hours previous to the principal shift going on, no doubt played an important part in the accumulation of the gas in Nos. 13 and 14 chutes, where the explosion occurred.

The ventilating-air came down the main slope and was split into two currents at No. 1 East level; one current ventilated the main slope and No. 1 West level, crossing the main slope by an overcast near the top of the slope to the East side counter-slope, where the fan was placed; the other current ventilated the East level, travelling along the level to No. 14 chute, the last working-place on the level, thence it passed up No. 14 chute and down No. 13 chute. There being no crosscut between No. 13 chute and No. 12 chute, the air-current was carried from No. 13 chute to No. 12 chute by means of brattice-cloth on the main level; it then ascended No. 12 chute, descended No. 11 chute, and passed through a crosscut, about 40 feet above the level, to No. 10 chute; thence up No. 10 chute, down No. 9 chute, and through a crosscut to No. 8 chute, continuing up the even-numbered chutes and down the odd-numbered chutes, and through crosscuts near the bottom of each chute until it reached the East counter-slope, and thence to the fan. The bottoms of the counter-slope and chutes 1, 2, 3, and 4 had board and dirt stoppings just above the level, whilst the chutes being worked were closed at the bottom by brattice-cloth only, to permit the descent of coal in the chutes and the passing through of men and material, a mode of ventilation which permitted a great deal of leakage and impaired the ventilation necessary for the use of the inside, or development places. Through failure to drive a line of crosscuts from the counter-slope across the faces of the breasts, the advantages of ascensional ventilation were lost, and the difficult method was used of dragging the lighter gases down through each of these breasts at an angle of 40 degrees.

The failure of the manager to see this can only be attributed to the lack of a thorough knowledge of the workings of his mine, and especially to the lack of a mine-plan.

As stated before, the plan of the mine had not been brought up to date since June, 1910, notwithstanding section 84 of the "Coal-mines Regulation Act," which provides for the plan being not more than three months from date.

From the evidence given at the Coroner's inquest, it would appear that there was no fixed speed at which the fan should run, and while it was not conclusively proven that the fan was slowed down by the demands of the hoist for steam, it was admitted that there was not sufficient steam to run the hoist and the pump at the same time; but we have the evidence of Harry Hogg, that he was instructed, on the morning of the explosion, to ask the engineer-in-charge to speed up the fan, and, as the engineer only started work at 7 a.m., it would be safe to assume that considerable time elapsed before sufficient steam was got up to drive the fan at its normal working-speed; therefore the ventilating-current must have been a variable quantity.

An examination of the fireboss's report-books shows that gas had been reported, on several occasions, at various points in the mine, and, from evidence obtained at the inquest, several men had been slightly burned by ignitions of gas. No notice of these accidents had been sent to the Inspectors or to the Department of Mines, as required by section 63 (*a*) of the "Coal-mines Regulation Act." While the mine was thus known to make gas, it did not make it in any large quantity, and the amount of ventilation available in the mine, if properly conducted, should have rendered this gas harmless.

The mine was worked with open lights, only two (Wolf) safety-lamps being on the premises, and these being presumably used for examination purposes only.

As already stated, the fireboss's report-book contains no report for the morning of the explosion, but, from the evidence of a survivor, Harry Hogg, rope-rider, we learn that Grimes passed in all the men on the East level except Pattie and Kallia; these men worked in Nos. 13 and 14 chutes, and were instructed by Fireboss Grimes to wait and that he would go in with them. This, together with the fact that the only two safety-lamps in the mine were, after the explosion, found hanging, one in No. 13 and one in No. 14, would indicate that, to the knowledge of Fireboss Grimes, gas was present in these chutes on the morning of the explosion. This is further substantiated by the fact that for two weeks after the explosion these places contained considerable gas, and that with the ventilating-current available the management had failed to move it.

We also have from the evidence of James Geator, who worked in the counter-slope below No. 1 East level, that a few minutes before the explosion he had come from his working-place to the siding on No. 1 East level, where he had seen Grimes, had asked him for a safety-lamp and had been informed that they were both in use, but that he (Grimes) would get him one in about an hour; showing that Grimes expected to have the gas out of Nos. 13 and 14 chutes by that time.

There is no evidence of extreme force at any point in the mine; the fan—a small dilapidated affair—was moved about 25 feet; the overcast, a flimsy board one, situated about 100 feet down the main slope, was blown out; and, at the siding on the entrance to No. 1 East level, a loaded car and a man, John Hogg, were blown across the slope, the man's body being found some 15 feet below No. 1 East level, while the car was found 150 feet below the same level; the stoppings at bottoms of the counter-slope and the various chutes were all out, but whether they were blown down on to the level, or otherwise, is far from being clear, as these stoppings, built of 1-inch boards backed up with refuse, and being on a pitch of 40 degrees, once moved in any direction, the material behind would slide to the level by the force of gravity. The level was thus more or less filled with debris from the stoppings and the broken-down centre pack-walls in the various breasts.

Those props, which through their location were not disturbed by material sliding down these chutes, were leaning towards the mouth of the level; the brattice-cloth which conducted the air on the level from No. 13 to No. 12 chute was found on the level between chutes Nos. 10 and 11; just inside of No. 12 chute, the lower portion of a sweater and a coat were found, while the upper portion of this sweater was found hanging on a prop at No. 13 chute; these evidences of force all pointed to the explosion having originated in Nos. 13 and 14 chutes.

In the chutes above the level it was hard to determine the direction of forces, as some of these chutes were swept clear, but whether from the force of the explosion or by the downward rush of the material from the broken pack-walls, is not quite clear, although the latter seems the more likely cause. The pack-walls in Nos. 5 and 6 chutes were completely demolished for 75 or 100 feet from the face.

The bodies on the level were all found flat, face down and with the head outward, except that of Kallia, who was crouched up on his knees, his hands over his head, but with his head outwards like the others. There can be little doubt but that all four men found on the level had moved after the explosion, as evidenced by their bodies being found on top of the refuse which had come down the chutes. Three of these four men, from evidence given at the inquest, had their noses broken, presumably in their rush to get out having run into the chutes which projected into the level; all four were badly burned on the hands, arms, face, neck, and upper body, Pattie being more severely burned than the others. The body of Baxter, who worked in No. 7 chute, showed no evidence of burns; this body was found 75 feet from the

bottom of the chute and about 100 feet from the face, where he had evidently been at work when the explosion occurred, as his cap, much torn, was found behind a prop at the face. A severe bruise was found on the side of his head, and his jaw was broken, he probably having been blown against the prop where his cap was found, the blow rendering him unconscious, when he fell down the chute to the point where his body was found.

Hurd's body was found 12 feet from the face of No. 6 chute, the head in the crosscut and the feet projecting out towards the chute; the body had been thrown with some force, having broken a small prop, which was bent around the body; the left leg was broken, the bone protruding through the flesh; three deep cuts, each about 1 inch long, on the left side of the face, and the body was badly burned down to the knees. A few feet farther down the chute his coat was found, and in the pocket was his watch, which had stopped at 9.51. The paper which had been wrapped around his lunch was hanging on a nail and was not burned, while the coat was severely singed.

Hogg's body, as already stated, was found on the main slope, and was much broken up. His neck, collar-bone, and thigh and lower leg were broken; there was a severe wound on the left arm and also on the back of the head; the body was not so severely burned as the others.

Baxter, Hurd, and Hogg were no doubt killed instantly. The doctor's evidence was that they all died from carbon-monoxide poisoning; no tests of the blood had been made by the doctor.

The level was quite wet; especially was this so at the inner end, where the roof and sides were quite damp. Evidences of coking of dust were found on the level about 40 feet inside of No. 14 chute, in Nos. 13 and 14 chutes, and in No. 9 chute.

Analysis of the dust from the level inside No. 14 chute was as follows:—

(A.)

Moisture	2.5 %
V.C.M.	13.0 "
F.C.	46.7 "
Ash	37.8 "
	100.0 "
Ratio V.C.M. to F.C.	3.6

The analysis of fine coal taken from the bottom of one of the chutes was:—

Moisture	2.3 %
V.C.M.	28.2 "
F.C.	48.1 "
Ash	21.4 "
	100.0 "
Ratio V.C.M. to F.C.	1.705

The normal analysis of a piece of coal taken off the level was:—

Moisture	1.4 %
V.C.M.	31.9 "
F.C.	61.4 "
Ash	5.3 "
	100.0 "
Ratio V.C.M. to F.C.	1.92

Analyses of dust taken from Nos. 13 and 14 chutes were as follows:—

(B.)		
	No. 1.	No. 2.
Moisture.....	1.9 %	2.2 %
V.C.M.....	22.3 "	20.6 "
F.C.....	47.3 "	53.8 "
Ash.....	28.5 "	23.4 "
	100.0 "	100.0 "
Ratio of V.C.M. to F.C.....	2.12	2.56

Analysis of dust taken from No. 9 chute, 100 feet from the face, was as follows:—

(C.)	
Moisture.....	2.0 %
V.C.M.....	21.4 "
F.C.....	58.6 "
Ash.....	18.0 "
	100.0 "
Ratio V.C.M. to F.C.....	2.74

The evidences of coking were not many nor severe; a little on the level, 40 feet inside No. 14 chute, which disappeared before reaching the face of the level; then in Nos. 13 and 14 chutes, from a few feet above the level to the face. The most extensive evidence of coking was found in No. 9 chute about 100 feet from the face, and about a similar distance above the crosscut to No. 8 chute; just above the crosscut was found the first evidence of coke, at the top of the props; in ascending the chute the coking kept coming down on the props until, about 100 feet above the crosscut, there was evidence of coke from the roof to the floor. This condition continued for about 15 or 20 feet, when above that, the coking kept getting higher on the props, and entirely disappeared about 50 feet from the face. This showed the meeting of two forces here, which halted the flame long enough to cause the coking.

At the face of this breast, the sandy shales overlying the coal had caved to the main sandstone, the cave being in a few large rocks which extended across the whole face 36 feet, and was probably 15 to 16 feet wide and from 2.5 to 3 feet thick.

On March 6th, the day before the explosion, the roof in this place was reported as sounding heavy; but from the evidence of David Cook, who worked in No. 10 chute, but who was not in the mine on the day of the explosion, sufficient props had been set to secure the roof before quitting-time that day.

No evidence of coking was found from here on until the main slope was reached, at the mouth of No. 1 West level, where Harry Hogg and Ralph Kilestro were burned.

From my examination of the mine, the tracing of the line of forces in the mine, and the evidence obtained at the inquest, I am led to the conclusion that the explosion originated in Nos. 13 and 14 chutes.

From the evidence taken at the inquest we learn that no powder of any kind was used in the mine except in the main slope, which was only worked on the afternoon shift.

We also learn from the evidence of Harry Hogg that Fireboss Grimes passed in all the men of the East level except Pattic and Kallia: these men he told to wait a minute or two and he would go in with them; from this and the fact that the only two safety-lamps in the mine were afterwards found, one in No. 13 and one in No. 14 chute, we may reasonably assume that there was an accumulation of gas in these places that morning. Therefore, assuming gas in Nos. 13 and 14 chutes, we come to the theory of how and when it was ignited.

The accumulation of gas in these chutes was no doubt due to the stoppage of the fan for seven or eight hours previous to the oncoming shift. It having been established already that Grimes knew of the presence of this gas, as also did Pattie and Kallia, they had evidently gone up the chutes to a point 8 or 10 feet above the level where the safety-lamps hung, and, finding it impossible to go farther, hung the lamps there and started to load coal, which must have been on the level from the previous day, each having loaded two cars of coal that morning. Fireboss Grimes had gone out the level and ordered the rope-rider, Harry Hogg, to tell the engineer to "speed up the fan," evidently to increase the ventilation.

About fifteen minutes before the explosion the rope-rider passed No. 1 East level, on the way to No. 1 West level, and Pattie was on the siding calling for cars. Grimes told the rope-rider to hurry up and put an empty trip into No. 1 East.

The fan having been speeded up, the increased ventilation had started to move the gas in Nos. 13 and 14 chutes; this gas would be brought down No. 13 chute and travel behind the brattice to No. 12 chute. About this time Pattie had returned from the siding and, passing under the brattice at the bottom of his chute, No. 13, ignited the gas which had been set in motion by the increased air-current. From the fact that the safety-lamp was found up the chute after the explosion, and that Pattie had been out at the siding, it is reasonable to assume that he had his open light with him. There being little evidence of great force and very little damage to the mine, I would assume there was not a large body of gas, and what gas was there was at its least explosive point. It might be termed more of an ignition than an explosion, the flame being augmented and supported wherever it found fresh coal-dust in suspension, as evidenced by the coking in No. 9 chute, where Templeton had loaded coal that morning, and inside No. 14 chute, where Kallia loaded coal; also at No. 1 West level, due no doubt to the fresh dust thrown into the air from the upsetting of the loaded car, which was thrown across the slope from No. 1 East level, and rolled 150 feet down the main slope.

The evidence of coke on the props in the East level was due to the back-lash of the flame in the dead end of the level just inside No. 14 chute.

The severe coking found in No. 9 chute can be explained as follows: The pressure on the level at the mouths of these two chutes being equal, the heated gases expanded into them, seeking relief; that part going up No. 9 chute found relief at the crosscut to No. 8 chute, thus decreasing the velocity at which it was travelling, and permitting that part which travelled up No. 10 chute, and which was augmented by the gases from No. 11, to travel faster, and rounded the face of the room, met the forces travelling up No. 9 side of the chute, and thus halted them sufficiently long to create the coking from roof to floor which exists here.

Whilst no coking was found in Nos. 5 and 6 chutes, there were evidences of heat, as the body of Hurd was severely burned; all over the face of this breast there was a heavy deposit of very fluffy dust, or perhaps it might more appropriately be called soot; as already explained, the pack-wall in this breast was demolished for from 75 to 100 feet from the face, showing this explosion had here again been augmented by the dust in suspension in this place, Hurd having loaded coal that morning.

In his description of the explosion to the Coroner's jury, James Ashworth seemed to attribute the accumulation of gas in Nos. 13 and 14 chutes to the cave in Nos. 9 and 10 chutes, and which would, by contraction of the air-course, reduce the quantity of air passing in the mine.

There is no direct evidence to prove that the cave occurred in Nos. 9 and 10 chutes before the explosion; in fact, all the evidence we have tends to disprove such assumption.

Harry Hogg, the rope-rider, testified that Grimes reported all places in the East level clear, except Nos. 13 and 14 chutes, and the fact that he went in with these men, and that

the only two safety-lamps in the mine were, after the explosion occurred, found in these two places, and that the explosion originated in these two chutes (which is concurred in by Mr. Ashworth), would go to show that the gas was already in these places when Grimes examined and reported Nos. 9 and 10 chutes clear. Then, again, the absolutely clean condition of the rocks in this cave from dust, in contradistinction to the faces of other breasts, would also prove that the cave occurred after the explosion, and also that there was still sufficient area over the caved portion to carry all the air that was in circulation in the mine.

There is one other point—in which Mr. Ashworth does not agree with me—namely, that Pattie ignited the gas in No. 13 chute. Mr. Ashworth seems to think that Pattie had not time to return from the siding at the mouth of No. 1 East level after being seen there by Harry Hogg, rope-rider, and therefore attributes the ignition to Kallia in No. 14 chute.

It makes no material difference in the theory as to whether this gas was ignited in the No. 13 side by Pattie, or on the No. 14 side of this chute by Kallia, which was to all practical purposes one and the same place. Nevertheless, the evidence as submitted at the inquest does not substantiate the theory that Pattie had no time to return from the siding to No. 13 chute after being seen there by Harry Hogg.

Hogg testifies that he passed No. 1 East level fifteen or twenty minutes before the explosion, and then saw Grimes, fireboss; Pattie, miner; and his brother, John Hogg, pusher, on the siding. He did not see James Geator, nor did Geator see Harry Hogg, and yet Geator testified that he came up the slope 100 feet or more on a 40-degree pitch, and interviewed Grimes *re* the question of a safety-lamp for his place. Geator, on being informed he could not get a safety-lamp, returned down the slope, and had just commenced to put on his clothes when the explosion occurred. Geator testified that he did not see Pattie on the siding, so that Pattie must have gone into his place previous to Geator's arrival there; yet, after his (Geator's) conversation with Grimes, Grimes reached No. 6 chute (225 feet from siding), where his body was found, which would certainly indicate that Pattie had ample time to reach No. 13 chute, which was only 225 feet farther in the level.

RESCUE-WORK.

The work of rescuing those alive in the mine and the recovery of the bodies of those killed was begun as soon as practicable.

The operations of the Diamond Vale Company being on a small scale, there was not any Draeger oxygen apparatus, so a locomotive was requisitioned, and the Draeger apparatus of the Nicola Valley Coal and Coke Company, Limited, and the Government Draeger apparatus were rushed to the mine as soon as possible, reaching there about forty or forty-five minutes after the explosion.

When the rescue party reached the mine, all the men who had been working in the other parts of the mine, not affected by the explosion, had reached the surface.

Charles Graham, David Brown, and Thomas Archibald, superintendent, overman, and fireboss respectively of the Nicola Valley Coal and Coke Company, Limited, donned the two-hour helmets and went down the slope. In going down the slope, Brown fell and injured his apparatus, which he exchanged with Archibald, the latter returning to the surface with the injured apparatus.

Graham and Brown proceeded into No. 1 East level as far as No. 8 chute and discovered the bodies of Grimes and Templeton; they returned to the slope, and, finding the ventilation fair, they discarded their helmets and proceeded, with help, to bring out the bodies. Later on these men were assisted by Andrew McKendrick, Robert Brown, and Peter Myers, of the staff of the Nicola Valley Coal and Coke Company; Andrew Bryden, superintendent of

the Inland Coal and Coke Company; Howell John, superintendent of the Pacific Coast Colliery, Limited; and many willing hands. Soon the bodies of the men on the level were taken out, and the more difficult work of ascending the chutes for the bodies of Baxter and Hurd was undertaken. This proved a very difficult task, with the chutes swept of props and with a slippery floor, on a pitch of 40 degrees; the task of ascending here, with the additional weight of the oxygen apparatus, proved too much for the party.

Owing to the smallness of the mine and the close proximity of the base to the work, the half-hour apparatus was used, when, with its lighter weight, some progress was made, and a rope was made fast to a prop about 50 feet from the face of No. 5 chute.

The remaining distance to the face proved too much for the majority of the party, several being overcome with the gases, and the party, being convinced no one could be alive in the chutes, retired for the night. The next morning the work was taken up again under the leadership of Superintendents Bryden and Graham, and, after a very trying day's work, the bodies of Hurd and Baxter were brought to the surface, about 5 p.m. the day following the explosion.

Here, again, the lack of a plan of the mine proved a great hindrance to the rescue party, as, owing to the absence of the manager, Mr. Browitt, who was unable to report on the morning of the 8th, no one in the rescue party knew the mine. Having difficulty in getting ventilation, the party concluded that by putting a stopping in the crosscut between Nos. 5 and 4 chutes they would thus drive the air up to the upper crosscuts; after spending some hours at this work, it was discovered that there were no crosscuts farther up the pitch, and the stopping had thus cut off the ventilation entirely from that section of the mine.

Considering the difficulties encountered on the pitch and the lack of knowledge of the mine, great credit is due every member of the rescue party for the spirit displayed and the work accomplished. The fact that no oxygen apparatus was at hand immediately after the explosion was not responsible for the loss of any life, as I am of the opinion that had the party been all ready and fully equipped to enter the mine as soon as the explosion occurred, it could not have saved one life, as all the victims were undoubtedly dead in a very few moments.

The general methods employed around the mine were not in accord with good mining practice; the lack of a line of crosscuts across the face of the breasts off the East level; the lack of a counter-level; the practice of closing down the fan seven or eight hours in every twenty-four; the variable speed at which the fan was run, and the poorly conducted air, all point to this conclusion.

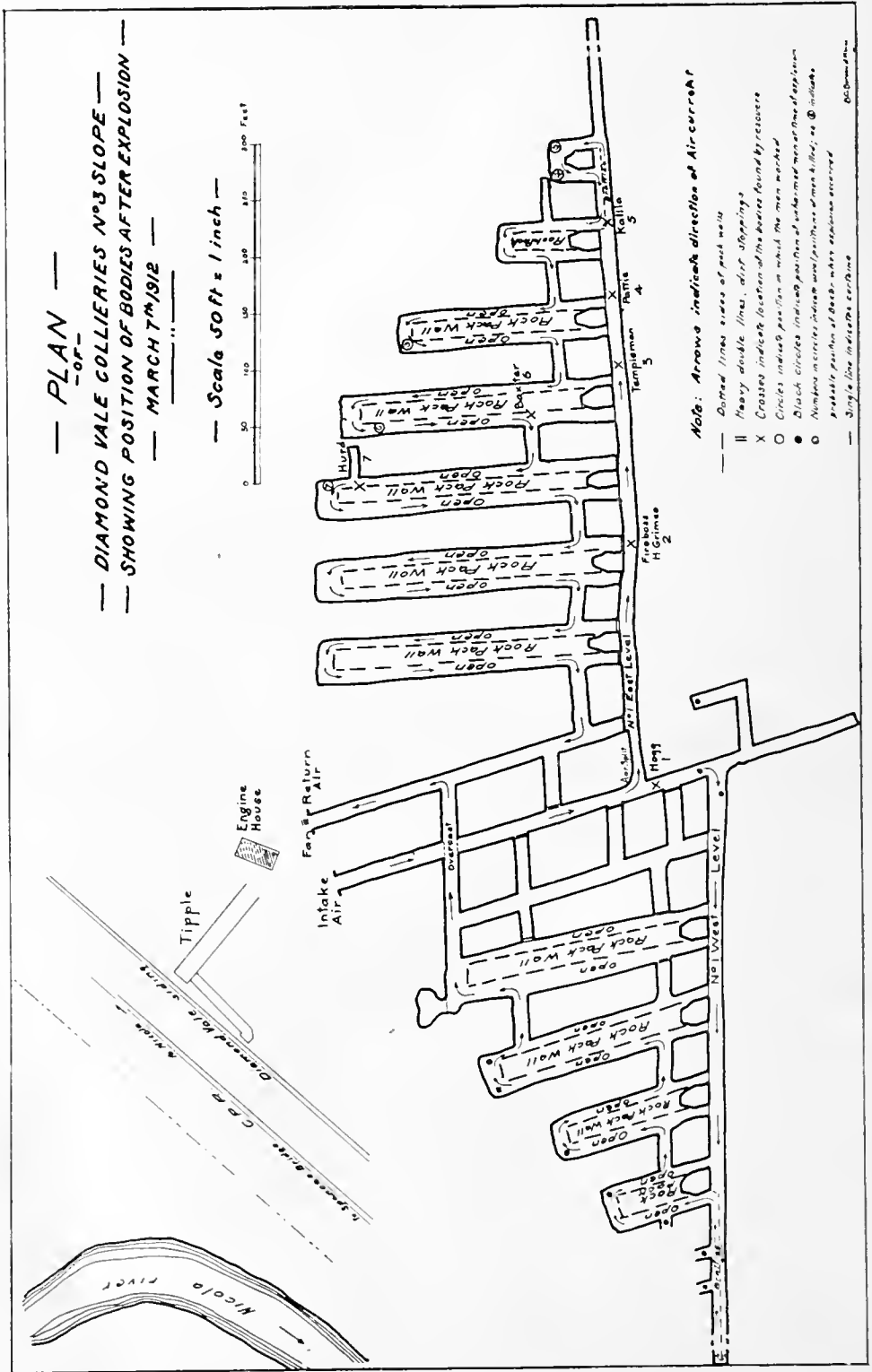
These, together with the fact that the manager, who was the only person qualified to make the examinations under General Rules Nos. 4 and 5, had delegated these duties to another person who was not qualified so to act; that he failed to see that a book was furnished in which the above-appointed person might record his examinations, in terms of General Rules Nos. 4 and 5, all show a deplorable want of discipline and of general supervision in the management of the mine.

In conclusion, let me say that the use of a few safety-lamps on the morning of the explosion would have prevented this disaster, and again we are reminded of the danger attached to the use of mixed lights in a mine containing explosive gas; I may add that the time is not far distant when every coal-mine, whether gaseous or non-gaseous, should and will be worked exclusively by safety-lamps.

Respectfully submitted,

THOMAS GRAHAM,

Chief Inspector of Mines.



INSPECTION OF METALLIFEROUS MINES.

WEST KOOTENAY AND BOUNDARY DISTRICTS.

REPORT BY JAMES MCGREGOR, INSPECTOR.

I have the honour to submit my annual report as Inspector of Mines for West Kootenay District for the year 1912.

SLOCAN DISTRICT.

The Slocan District continued to increase in importance during the year; in addition to the several large development schemes which were launched last year, and which have been operated continuously during the year with encouraging results, several others of equal importance have been started this year.

Most of these developing projects consist of large tunnels to cut the ledges at considerable depth; some of them have attained great length and depth, with every prospect of becoming in the near future equally as valuable as the properties which operated with such success in the same localities some years ago; in fact, some of the long tunnels are being bored with the intention of cutting the continuations of the old ledges.

Upon inspection of the operating mines, I found them well ventilated and carefully timbered. The manner of handling of the small amount of powder necessary in this district has been discouraging, two serious accidents having occurred from unexploded powder, one from gelignite, and one from gelatine.

It is difficult to become absolutely satisfied where the fault, if any, exists, as there are so many ways it can occur; I especially mention this knowing it will receive your consideration.

SHEEP CREEK CAMP, YMIR DISTRICT.

The shipping mines in this district remain the same in number as last year; the developing of new properties is still very active, as is also the prospecting, with encouraging results, of new finds.

I have invariably found, upon inspection, the mines in a safe and sanitary condition, well ventilated and timbered, and the thawing of explosives being done in conformity with the Act.

ROSSLAND CAMP.

The mines of this camp are the deepest in the Province, and, I may say, in the Dominion; the *Centre Star* shaft is the deepest being 2,400 feet, others nearly equalling it. These great depths require powerful equipment in machinery, ropes, cages, or skips, which, I have always found upon inspection, are kept in good and safe condition.

These mines are all timbered by what is known as the square-set system; consequently a great quantity of timber is required, all of which is framed on the surface by machinery. Upon inspection, I have found great care exercised in placing the timbers in position underground.

The hard nature of the ores and associated rocks in this district necessitate the use of large quantities of a very high explosive, and I have found, upon all occasions when making inspections, especial care being exercised in the thawing, transportation, and handling of the explosive underground.

The ventilation is good, all the operating mines being connected underground to each other in many places; the travelling-ways and ladder-ways I have always found in good condition, and the Act in every respect observed.

LARDEAU DISTRICT.

In this district there has not been any increase in the number of shipping mines during the year; prospecting and developing have been more active than usual, with every sign of becoming very prosperous in the near future.

AINSWORTH DISTRICT.

The number of shipping mines in this district has greatly increased during the year, much activity prevailing, with the prospect for the future very bright.

Upon inspection of the mines in operation in this district, some of them having been closed for years, I have found every care being taken in reopening them; the ventilation, timbering, and travelling-ways are in good, safe condition, and the Act in all other respects equally well observed.

NELSON DISTRICT.

There has been a marked improvement in this district during the year, by an increase in the number of shipping mines, also by much greater activity in developing and prospecting; altogether the future looks very bright for this locality.

Upon inspection, I found the mines in a safe condition, the Inspection Act being carefully observed in every respect. With regard to ventilation, timbering, and handling of explosives, I found care being exercised.

YMIR DISTRICT.

Development has been the principal work carried on in this district during the year; the number of shipping mines has not increased during the year, but very satisfactory results have been obtained from the development which has been in progress.

Upon inspection of the mines which came under the "Metalliferous Mines Inspection Act," I found them in a safe condition.

BOUNDARY DISTRICT.

The mines of this district have been operated continuously during the year, most of them making an increased output. The system of mining that has been followed, known as the pillar and open-stope system, makes it possible to dispense with timbers in the stopes; the large tonnage produced at the mines of this district necessitates the consumption of a great amount of powder for breaking the ores in such large quantities.

Some idea of the system can be gathered when the average machine, drilling fourteen hours, in underground stopes during the twenty-four hours, breaks on an average 110 tons a day.

In the B.C. Copper Company *Mother Lode* mine in this district a somewhat unique system has been adopted underground, where as many as 2,400 holes, averaging 14 feet in depth, requiring about 11 tons of powder to charge them, have been blasted at one time. These blasts removed all the pillars, bridges, and sill floors between the 60-foot level and the 200-foot level, breaking as much as 175,000 tons of ore at one blast.

Upon inspection, I have found the mines of this district in a fairly safe condition, the Act being conformed with in every respect.

Appended will be found a list of the accidents which occurred during the year in this district.

EAST KOOTENAY INSPECTION DISTRICT.

EVAN EVANS, INSPECTOR.

The only metalliferous mines in this district being actually worked during the past year were the *St. Eugene* and *Sullivan*, both operated by the Consolidated Mining and Smelting Company of Canada, with a small force employed at the *Society Girl*.

Fortunately no accidents occurred in these mines during the past year, so Mr. Evans has not made any report.

SIMILKAMEEN INSPECTION DISTRICT.

REPORT OF ROBERT STRACHAN, INSPECTOR.

I have the honour to submit my annual report, as Inspector of Metalliferous Mines for the Similkameen District, for the year ending 1912.

The only metalliferous mine in this district in operation during the present year was the *Nickel Plate*, belonging to the Hedley Gold Mining Company, Limited, Hedley, B.C. The mine is situated almost at the top of the Nickel Plate mountain, about 4,000 feet above the town of Hedley, where the mill is situated. G. P. Jones, general manager; Wm. Sampson, mine manager; Wallis Knowles, engineer.

The ore is gold-bearing and is mined by a "pillar and chamber" system, commencing on the foot-wall and working upwards, using the broken ore as a floor for the miners to stand on.

The rock is so strong that timber is rarely used, except in the tunnel entrances, and chambers as large as 260 feet wide, 400 feet long, and 30 feet high, without any support, are sometimes to be seen.

In leaving the roof of these chambers, great care is taken to bar or blast down all the loose rock, and it certainly indicates with what thoroughness this is done that we have so few accidents to report from falls of roof.

The property has been developed by tunnels driven through the country-rock until they reach the ore-body; No. 4 tunnel is the lowest of these, and all the ore below this is expected to be reached by winzes from this level, the ore being drawn from the chutes and hoisted to an ore-bin at No. 4 level.

The ore from this bin and from the pillars above is loaded into small cars holding 2 tons; these cars, in trips of ten, are drawn by electric motor to the ore-bin at the top of the gravity-tramway.

This gravity-tram is operated in two stages; in the first stage, the ore, which is loaded into skips carrying 5 tons, is lowered down 4,000 feet; during part of this distance an auxiliary compressed-air locomotive assists the loaded skip. At the Central station the skip is transferred by means of a fast rope, the empty from the lower tramway being held by this fast rope, while the lower tramway rope is fastened to the loaded skip; the top tramway rope is then taken off and fastened to the empty skip, which continues its journey to the top, the loaded skip proceeding to the bottom. An automatic dumping arrangement permits of the skip unloading into an ore-bin, from which the ore is taken as required for the mill.

The incline has a three-rail track with a passing in the centre, and is equipped with both electric bells and telephone. In running the incline, by an ingenious arrangement of weights, the engineer takes the brakes off to allow the tram to run; should an accident arise to the engineer or should he neglect his duty, the breaks immediately take effect and stop the skip.

All the ore mined goes to the mill; there is practically no waste, and no sorting is done either at the mine or the mill; the average daily output is about 200 tons, and, by a judicious mixing of different grades, the average value is kept fairly constant, which allows of the treatment of much low-grade ore, which it would be unprofitable to treat alone.

The power plant, which is operated by water during the greater part of the year, is also fitted so that steam can be used when required, and consists of one 360-kw. 2,200-volt Westinghouse generator driven by a 400-horse-power Pelton-type water-wheel; a 500-horse-power Goldie-McCulloch Corliss condensing-engine, so placed that it can operate the generator in the event of the water-power failing.

One two-stage, cross-compound, steam-condensing Corliss-gear Rand compressor, capacity about 3,000 cubic feet of free air a minute, compressed to 125 lb.; this compressor is also provided with a 26-foot Pelton water-wheel, and only uses steam when the water fails.

As an auxiliary is a 100-kw. generator driven by a water-wheel for lighting purposes; also an 18- x 24-inch straight-line Rand compressor. The boiler plant consists of three 150-horse-power, two 100-horse-power return-tubular boilers, and one 100-horse-power Mumford boiler used for heating purposes at 10 lb. pressure.

During my inspection of this mine I have always found the "Inspection of Metalliferous Mines Act" being strictly complied with, and it seems to me that great care is taken to protect the workmen.

Special rules are provided, in addition to the Mines Act, and these rules must be read before a workman is engaged.

In spite of all precautions, I regret to have to report three accidents, two of which were fatal; the first accident, causing the death of two miners, was reported to James McGregor, Inspector of Mines, Nelson, who at that time covered this district. The second occurred to a drill-helper who was descending the slope; he left the side where a handrail was provided and, in crossing over, slipped on the ice and rolled down the slope, receiving serious injuries. The third accident was the result of the use of explosives, and had the special rules been carried out the accident should not have occurred.

A list of these accidents is attached.

COAST INSPECTION DISTRICT.

THOMAS MORGAN AND JOHN NEWTON, INSPECTORS.

The only metalliferous mines of any size being worked in the Coast Inspection District are the *Britannia*, on Howe Sound, employing upward of 700 men and mining 193,000 tons of ore a year; the *Marble Bay*, employing seventy men and mining 17,870 tons of ore; and the *Little Billie*, employing twenty-two men and mining 1,970 tons of ore.

From none of these has any accident been reported this past year, the only accident reported by Mr. Newton being a slight accident to a timberman in the Reliance Mining Company's property at Vananda, Texada island.

REPORT OF THOMAS MORGAN.

I have the honour to submit my report of the metalliferous mines in my district during the year 1912.

Marble Bay Mine, Texada Island.—This mine is operated by the Tacoma Steel Company. The shaft is sunk 1,350 feet, with levels turned off at regular intervals, and all the levels are connected by a downcast slope, making a good ventilation. A good supply of fresh air is circulating through this mine, caused by all the slopes being connected from the surface to the bottom of the shaft. This slope has a good ladder-way protected by handrails. The bottom level in this mine is called the 1,350-foot level, and is in operation with several more level workings.

Machinery installed: Two boilers, 100 and 85 horse-power; one Canadian Rand compressor, 10-drill; five Lidgerwood hoists, three below and two on top; one electric 7-kw. dynamo.

Little Billie Mine, Texada Island.—This shaft is down 170 feet. A good ventilation is circulating all through the workings. There is a good ladder-way, well protected. The mine was in good condition. Two levels were turned off from the bottom of the shaft, East and West. There was only the West level working when I was there. Fogle, superintendent.

Britannia Mine.—This mine is situated up Howe Sound, but twenty-eight miles from Vancouver. It is four miles up the mountain from Britannia Beach, at an altitude of 4,200 feet above the sea-level.

The ore is brought down to the Beach by an aerial tramway for four miles to the crusher at the Beach. When I last visited this mine I found the condition good, and well timbered where it was necessary. The ventilation was good, caused by open portals being connected with the open surface. A good ladder-way is connected from the lower level to the top level. All the ore runs down one large chute from the top level to the bottom, and is hauled out by a 3-ton electric motor to the tramway bins, and from there conveyed to the beach by the aerial tramway. There are six levels in operation and quite a lot of men employed.

Machinery installed: One Canadian Rand stage compressor, 2,400 cubic feet capacity, driven by a Pelton wheel; two 200-kw. A.C. generators, 6,600 volts, driven by a Pelton wheel; two No. 6 Champion crushers, conveyor-belts, etc., driven by electric motor; 6 x 6 hoist, double-cylinder, driven by compressed air; one continuous-cable haulage system, driven by electric motor; one timber-elevator, 6 x 6, double cylinder; also an 8-inch air-line conveying the compressed air from the Beach to the mine, a distance of four miles. J. W. D. Moodie, general manager, and Wm. A. Wyllie, mine manager.

LIST OF ACCIDENTS IN METALLIFEROUS MINES, 1912.

REPORT BY JAMES MCGREGOR, INSPECTOR, WEST KOOTENAY.

No.	Mine.	Date.	Name.	Occupation.	Details.
1	Granby, Phoenix.....	Jan. 27	Tim Baldwin..	Mucker- [boss	Killed on surface by allowing muck to drag him into chute.
2	Josie, Rossland.....	Feb. 1	J. Stefanich...	Cage-tender.	Killed in shaft by cage.
3	Granby, Phoenix.....	Feb. 7	S. H. Cummin- [ger	Miner.....	Killed by falling into ore-pocket.
4	Rawhide, Phoenix.....	Feb. 29	Edward [Julsrud	Chuteman...	Foot crushed on surface ore-dump by car, necessitating amputation.
5	Blue Bell, Ainsworth...	Apr. 2	Manus [McShane	Miner.....	Suffocated by powder-gas in a raise.
6	Gold Drop, Phoenix....	Apr. 16	Steve Aliment.	".....	Killed by falling from bench into chute.
7	Rawhide, Phoenix.....	June 7	Bert Davis....	".....	Foot crushed by falling rock in stope.
8	Lucky Jim, Slocan....	Sep. 8	Isaac Laurilla.	".....	Exploded powder in muck while picking; eyes severely injured.
9	Lucky Jim, Slocan....	Sep. 8	Alex. Norquist	".....	Slightly injured in same accident.
10	Payne, Slocan.....	Oct. 17	G. W. Clark...	Foreman..	Exploded powder in muck while picking; lost one eye and injured.
11	Payne, Slocan.....	Oct. 17	Emil Johnston.	Shoveller...	Same accident, injured about face and eyes.
12	Payne, Slocan.....	Oct. 17	Mike Marlick..	".....	Same accident slightly injured about face.
13	No. 1, Ainsworth....	Oct. 19	James Currie..	Miner....	Drilled into a hole which had been blasted, and exploded same; powder still contained therein.
14	No. 1, Ainsworth....	Oct. 19	Patrick [McGeehin	".....	Same accident, injured about face and eyes.
15	Molly Gibson.....	Oct. 20	Agustus [Satermoen	".....	Right ankle broken when he jumped from ladder.

REPORT BY ROBERT STRACHAN, INSPECTOR, SIMILKAMEEN DISTRICT.

16	Nickel Plate, Osoyoos [M.D.	Jan. 18	A. McAllister.	Miner.....	Picked into missed hole, which exploded and killed him.
17	Nickel Plate, Osoyoos [M.D.	Jan. 18	Wm. Coward..	".....	Killed in same accident.
18	Nickel Plate, Osoyoos [M.D.	May 14	J. Hardman...	Labourer....	Fell down slope: seriously injured.
19	Nickel Plate, Osoyoos [M.D.	July 13	J. Roddick....	Blaster.....	Returned to place too soon and was killed by blast.

REPORT BY JOHN NEWTON, INSPECTOR.

20	Reliance.....	June 9	A. McPherson.	Timberman..	Slightly injured on forehead.
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TABULATED LIST OF ACCIDENTS IN METALLIFEROUS MINES, 1912.

	CAUSE OF ACCIDENT.	EXTENT OF INJURY.			TOTAL.
		Fatal.	Serious.	Slight.	
A	Blasting	1	.	..	1
B	Defective powder .....	..	..	..	..
C	Drilling into old holes containing powder	2	1	1	4
D	Powder in muck .....	..	2	3	5
E	Shafts and cages, accidents connected with	1	..	..	1
F	Falling down shafts or winzes .....	..	1	..	1
G	Falling down chutes	2	..	..	2
H	Mine-cars .....	..	..	..	..
I	Rock falling in stopes, levels, etc. ....	..	..	..	..
J	Rock falling down chutes or openings .....	..	.	1	1
K	Timbering .....	..	..	1	1
L	Miscellaneous, underground	1	1	..	2
M	Miscellaneous, surface	1	1	..	2
	Totals	8	6	6	20
Accidents for each 100,000 tons ore mined.		0.296	0.222	0.222	0.740
Accidents for each 1,000 men employed		2.10	1.58	1.58	5.26

COAL-MINING IN BRITISH COLUMBIA.

BY WM. FLEET ROBERTSON, PROVINCIAL MINERALOGIST.

The year 1912 proved to be, as far as statistics of production will show, one of the most successful in the history of coal-mining in the Province.

During this year the total gross production of coal made in the Province was 3,025,709 tons (2,240 lb.) of coal, which is only some 113,526 tons short of that of 1910, which is still the "record year" in coal-mining.

Had it not been for the labour troubles, occurring in the later months of 1912, at the mines of the Canadian Collieries on Vancouver Island, whereby that company's output was reduced to a point 150,000 tons lower than the preceding year, there is little doubt but that 1912 would have been the record year to date, instead of occupying, as it does, only second place; yet, with the exception noted, it is greatly in advance of any other year.

The total sales of coal made in 1912 was 2,230,565 tons (2,240 lb.), of which 1,263,427 tons was sold in Canada, practically British Columbia; 858,981 tons was exported to the United States, including Alaska; while 108,157 tons was exported to other countries.

The coke sales of the Province for the year was 267,564 tons (2,240 lb.), of which 217,307 tons was sold in British Columbia and 50,257 tons exported to the United States.

The following table shows, for the past six years, the output and the *per capita* production of the various districts:—

Year.	District.	Gross Tons of Coal mined during Year.	Total No. of Employees at Colliery.	Tons of Coal mined per Employee for Year.	Number of Men employed Underground.	Tons of Coal mined per Underground Employee for Year.
1907	East Kootenay District	876,731	2,290	383	1,527	574
	Coast District	1,342,877	3,769	356	2,862	469
	Whole Province	2,219,608	6,059	366	4,389	506
1908	East Kootenay District	883,205	2,524	350	1,746	506
	Coast District	1,226,182	3,549	345	2,686	456
	Whole Province	2,109,387	6,073	347	4,432	476
1909	East Kootenay District	923,865	2,427	380	1,737	532
	Coast District	1,476,735	3,991	370	2,976	496
	Whole Province	2,400,600	6,418	374	4,713	509
1910	East Kootenay District	1,365,119	3,111	439	2,374	575
	Coast District	1,774,116	4,647	382	3,529	502
	Whole Province	3,139,235	7,758	404	5,903	532
1911	East Kootenay District	442,057	2,197	201	1,585	272
	Coast District	1,855,661	4,676	397	3,627	511
	Whole Province	2,297,718	6,873	334	5,212	440
1912	East Kootenay District	1,261,212	2,410	523	1,780	708
	Coast District	1,764,497	4,720	374	3,495	504
	Whole Province	3,025,709	7,130	424	5,275	574

While no figures can be given as to the actual cost of mining in the different fields, the *per capita* production of these fields is of interest, as having a bearing upon the working costs and as indicating the mining facilities existing and the improvement made in these conditions from year to year.

It will be seen from the above table that the production *per capita* has steadily and materially increased during the past three years. This increased effectiveness of the labour employed is largely due to better methods, better equipment, and greater volume of output.

The figures given for 1911 are the actual statistics for that year, but they are in a way misleading for comparison with other years as regards the *per capita* production of the whole Province and of the East Kootenay field, since during that year the collieries of this latter field closed for eight months owing to labour troubles, while in the Coast District they represent a full year's work.

In the Coast District the effectiveness of the employee, both total and underground, has not altered very materially in the last three years, and is considerably lower than in the East Kootenay District.

In the East Kootenay field the effectiveness of the total employees has increased from 439 tons in 1910 to 523 tons in 1912, while the *per capita* output of the underground employee has similarly increased from 575 tons to 708 tons, a very remarkable and encouraging improvement.

The coalfields of the Province which are at present producing may be divided into two main divisions—those of the East Kootenay District and those of the Coast District.

These fields from their geographic positions—the one at the extreme eastern boundary of the Province, and the other at the extreme western edge—are in no way competitors in the market, their markets being quite separate and ruled by completely different conditions.

The market of the East Kootenay field is provided primarily by the railways of the south-eastern part of the Province and of the northern parts of the adjoining States of Montana and Washington, approximately two-thirds of the coal sold as such being exported to those States, while the other third went to supply the demands of the south-eastern part of the Province—its domestic needs, its railways, steamboats, mines, and smelters.

Coke, a product of the coal-mines, is sold in the same markets, with the difference that the local consumption—chiefly by the smelters of Trail and the Boundary District—takes over 80 per cent. of the product, while 20 per cent. is exported to the States mentioned.

As regards the marketing conditions in this field, the East Kootenay collieries are, however, brought into direct competition with the collieries of Alberta just over the Provincial boundary-line, all these collieries being in the same coalfield, with practically the same grade of coal and working under similar conditions.

This competition has kept the price obtainable for coal at from \$2.25 to \$2.50 a ton, with little probability of any material increase in price, owing to the facility with which new collieries can be opened up and the very large reserve areas of coal limits in that district; a description of these reserves was given in the Report of this Bureau for the year 1909.

The Coast District may be subdivided into two fields—the Nicola-Princeton field and the Vancouver Island field—in which the markets differ considerably.

In the former field the consumption is chiefly by the local railways, while a small amount finds its way to Vancouver, even under the handicap of what seems to be an excessively high freight charge.

The Vancouver Island coal market is provided by the domestic and manufacturing requirements of the Coast cities, and of the ocean-going steamers calling at these ports.

The demand for coal from the larger coasting steamers and from the railways has in the past couple of years diminished, as the Canadian Pacific Railway main line engines are nearly all burning California crude oil, and a large coasting steamer burning coal is now an exception.

Notwithstanding the heavy consumption of crude oil, the coal sales have remained about constant, approximately 70 per cent. of the coal sold being for use in British Columbia, 20 per cent. exported to the United States, and 10 per cent. to other countries, chiefly Mexico.

In the Coast District the demand for export coal has been so great and constant, particularly on the seaboard, and the prices obtainable so satisfactory to the shippers, that it has permitted of the domestic price being kept at a figure so high as to admit of the importation from California of fuel oil as a competitive fuel, where conditions permit of its use.

It would appear, therefore, that the present price of coal on the seaboard, of from \$4 to \$4.50 a ton f.o.b., it is not liable to decrease for some time.

As in former years, the greater proportion of this product was made by three larger companies—the Crow's Nest Pass Coal Company, with two collieries in East Kootenay, and by the Western Fuel Company, of Nanaimo, and the Canadian Collieries, Limited, formerly the Wellington Colliery Company, these last two operating on Vancouver Island.

In addition to these larger shippers, very appreciable shipments have been made by the Hosmer Mines, Limited, and the Corbin Coal and Coke Company, in East Kootenay; by the Nicola Valley Coal and Coke Company, the Diamond Vale Collieries, and the Inland Coal and Coke Company, all of the Nicola Valley; by the Princeton Coal and Land Company, of Princeton; and by the Pacific Coast Coal Mines, Limited, and Vancouver & Nanaimo Coal Mining Company, both operating on Vancouver Island, near Nanaimo.

The details of the shipments made by each of these companies will be found in reports of the Inspectors of the various districts.

During the year 1912 about 56.65 per cent. of the coal, sold as such, by the collieries of the Province was consumed in British Columbia; about 38.51 per cent. was exported to the United States, including Alaska; and 4.81 per cent. was exported to other countries, chiefly to Mexico. Of the coke sold, about 81.23 per cent. was consumed in British Columbia, and the remaining 18.77 per cent. was exported to the United States.

The distribution of this output of coal and coke is shown in the following table:—

COAL AND COKE PRODUCED, EXPORTED, ETC., BY PROVINCE DURING YEAR 1912.

SALES AND OUTPUT FOR YEAR. (Tons of 2,240 lb.)	COAL.		COKE.	
	Tons.	Tons.	Tons.	Tons.
Sold for consumption in Canada.....	1,263,427		217,307	
" export to United States.....	858,981		50,257	
" " other countries.....	108,157			
Total sales.....		2,230,565		267,564
Lost in washing.....	175,744			
Used in making coke.....	396,905			
" under colliery boilers, etc.....	240,304		91	
Total for colliery use.....		812,953		91
Stocks on hand first of year.....	66,380	3,043,518	7,510	267,655
" last of year.....	48,571		4,188	
Difference taken from stock during year.....		17,809		3,322
Output of collieries for year.....		3,025,709		264,333

Coal (used as such) 2,628,804 tons = \$9,200,814. Coke, 264,333 tons = \$1,585,998.

NUMBER OF HANDS EMPLOYED, DAILY WAGES PAID, ETC.

CHARACTER OF LABOUR.	UNDERGROUND.		ABOVE GROUND.		TOTALS.	
	No. employed.	Average Daily Wage.	No. employed.	Average Daily Wage.	No. employed.	Average Daily Wage.
Supervision and clerical assistance.....	199		111		310	
Whites—Miners.....	2,503				2,503	
Miners' helpers.....	567				567	
Labourers.....	926		667		1,593	
Mechanics and skilled labour.....	610		587		1,197	
Boys.....	147		74		221	
Japanese miners.....	55				55	
" labourers.....	46		16		62	
Chinese miners.....	85				85	
" labourers.....	137		400		537	
Indians.....						
Totals.....	5,275		1,855		7,130	

COLLIERIES OF THE COAST DISTRICT.

The gross output of the Coast collieries, including the Nicola valley, for the year 1912 was 1,764,497 tons (of 2,240 lb.) of coal actually mined, while some 16,894 tons was taken from "stock," making the actual consumption of coal 1,781,391 tons.

Of this gross consumption, 1,447,747 tons was sold as coal, 157,900 tons was consumed by the producing companies as fuel, and 175,744 tons was lost in washing; no coal was used in making coke. Although no coke was produced, 4,266 was taken from stock and sold.

Formerly, in 1902, the Coast collieries exported to the United States 75 per cent. of their coal; in 1910 they exported there only 24.5 per cent. of their product, 71.3 per cent. of the output being consumed in Canada. In 1911, 76.1 per cent. of the coal sold was for consumption in Canada, 21.6 per cent. was exported to the United States, and 2.3 per cent. to other countries.

In 1912, 71.25 per cent. was sold for consumption in Canada, 21.25 per cent. exported to the United States, and 7.47 per cent. to other countries.

The following table gives an aggregate summary of the output of the Coast collieries for the year 1912 and shows the dispositions made of such product:—

SALES AND OUTPUT FOR YEAR.	COAL.		COKE.	
	Tons.	Tons.	Tons.	Tons.
(Tons of 2,240 lb.)				
Sold for consumption in Canada.....	1,032,351	.....	4,266	.....
" export to United States.....	307,239	.....		.....
" " other countries.....	108,157	.....		.....
Total sales.....		1,447,747		4,266
Lost in washing.....	175,744	.....		.....
Used in making coke.....	157,900	.....		.....
" under colliery boilers, etc.....				
Total for colliery use.....		333,644		
		1,781,391		
Stocks on hand first of year.....	64,564	.....	6,636	.....
" last of year.....	47,670	.....	2,370	.....
Difference taken from stock during year.....		16,894		4,266
Output of collieries for year.....		1,764,497		

NUMBER OF HANDS EMPLOYED, DAILY WAGES PAID, ETC.

CHARACTER OF LABOUR.	UNDERGROUND.		ABOVE GROUND.		TOTALS.	
	No. employed.	Average Daily Wage.	No. employed.	Average Daily Wage.	No. employed.	Average Daily Wage.
Supervision and clerical assistance.....	131	.....	77	.....	208	.....
Whites—Miners.....	1,626	.....		.....	1,626	.....
Miners' helpers.....	412	.....		.....	412	.....
Labourers.....	707	.....	343	.....	1,050	.....
Mechanics and skilled labour.....	174	.....	337	.....	511	.....
Boys.....	122	.....	52	.....	174	.....
Japanese miners.....	55	.....		.....	55	.....
" labourers.....	46	.....	16	.....	62	.....
Chinese miners.....	85	.....		.....	85	.....
" labourers.....	137	.....	400	.....	537	.....
Totals.....	3,495	.....	1,225	.....	4,720	.....

The following tables show the output of coal, and the disposition made of it, in the subdivisions of the Coast District:—

COAL-OUTPUT, ETC., 1912, VANCOUVER ISLAND SUB-DISTRICT.

SALES AND OUTPUT FOR YEAR.	COAL.		COKE.	
	Tons.	Tons.	Tons.	Tons.
(Tons of 2,240 lb.)				
Sold for consumption in Canada	846,098			
" export to United States	303,673			
" " other countries	108,157			
Total sales		1,257,928		
Lost in washing.....	171,733			
Used in making coke.....	145,389			
" under colliery boilers, etc				
Total for colliery use		317,122		
		1,575,050		
Stocks on hand first of year.....	63,949			
" last of year.....	47,139			
Difference taken from stock during year.....		16,810		
Output of collieries for year.....		1,558,240		

COAL-OUTPUT, ETC., 1912, NICOLA-PRINCETON, SUB-DISTRICT.

SALES AND OUTPUT FOR YEAR.	COAL.		COKE.	
	Tons.	Tons.	Tons.	Tons.
(Tons of 2,240 lb.)				
Sold for consumption in Canada.....	186,253			
" export to United States.....	3,566			
" " other countries.....				
Total sales		189,819		
Lost in washing.....	4,011			
Used in making coke.....	12,511			
" under colliery boilers, etc.....				
Total for colliery use.....		16,522		
		206,341		
Stock on hand first of year.....	615			
" last of year.....	531			
Difference taken from stock during year.....		84		
Output of collieries for year.....		206,257		

COLLIERIES OF THE EAST KOOTENAY DISTRICT.

The gross output of the collieries of the East Kootenay District for the year 1912 was 1,261,212 tons (2,240 lb.) of coal actually mined, which, with 915 tons taken from stock, made the actual consumption of coal 1,262,127 tons. Of this gross consumption of coal, 782,818 tons was sold as coal, 82,404 tons was consumed as fuel by the producing companies, while 396,905 tons was converted into coke, producing 264,333 tons, of which 91 tons was used under the companies' boilers, while 914 tons was added to stock, making the coke sales for the year 263,389 tons.

The East Kootenay collieries exported to the United States about 70.5 per cent. of the coal sold and about 6.4 per cent. of the coke.

The following table gives an aggregate summary of the output of the East Kootenay collieries for the year 1912, and shows the dispositions made of such product:—

SALES AND OUTPUT FOR YEAR. (Tons of 2,240 lb.)	COAL.		COKE.	
	Tons.	Tons.	Tons.	Tons.
Sold for consumption in Canada	231,076	.....	213,041	.....
" export to United States.....	551,742	.....	50,257	.....
" " other countries .....	.....	.....	.....	.....
Total sales.....	.....	782,818	.....	263,298
Used in making coke.....	396,905	.....	.....	.....
" under colliery boilers, etc.....	82,404	.....	91	.....
Total for colliery use.....	.....	479,309	.....	91
Stocks on hand first of year	1,816	1,262,127	.....	263,389
" last of year.....	901	.....	874	.....
Difference { * added to } stock during year .....	.....	.....	1,818	.....
{ + taken from }	.....	.....	.....	*944
Output of collieries for year .....	.....	1,261,212	.....	264,333

NUMBER OF HANDS EMPLOYED, DAILY WAGES PAID, ETC.

CHARACTER OF LABOUR.	UNDERGROUND.		ABOVE GROUND.		TOTALS.	
	No. employed.	Average Daily Wage.	No. employed.	Average Daily Wage.	No. employed.	Average Daily Wage.
Supervision and clerical assistance.....	68	\$	34	\$	102	.....
Whites—Miners	877	.....	.....	.....	877	.....
Miners' helpers	155	.....	.....	.....	155	.....
Labourers	219	.....	324	.....	543	.....
Mechanics and skilled labour	436	.....	250	.....	686	.....
Boys	25	.....	22	.....	47	.....
Japanese .....	.....	.....	.....	.....	.....	.....
Chinese .....	.....	.....	.....	.....	.....	.....
Indians .....	.....	.....	.....	.....	.....	.....
Totals.....	1,780	.....	630	.....	2,410	.....

COAL POTENTIALITIES OF BRITISH COLUMBIA.

In addition to the coal-mines actually producing and whose outputs are included in the foregoing tables, there are a number of important fields which have not as yet reached the producing stage—some of these partly developed and equipped, and others only prospected.

That these fields contain a large reserve of coal there is absolutely no doubt, and many of them will be developed and producing as soon as the market demands it and the transportation facilities can be provided.

The great unworked and only partly developed coal-seams in the Rocky Mountains coal-field lying to the north of the field now being exploited was fully described by the writer in the 1909 Report, since when no great amount of development-work has been done. Very successful development has been going on in the Flathead valley.

Near Princeton, in addition to the colliery of the Princeton Coal and Land Company, which shipped some 21,386 tons of very good lignitic coal, a new colliery has begun shipping—the United Empire—making a start this year by shipping 500 tons.

In the same section the Columbia Coal and Coke Company has continued development all year with a force of seventy men, but has not as yet begun shipping.

In the Nicola valley the Pacific Coast Coal and Coke Company has continued development with a small force, and, although not shipping, reports indicate that the development has been successful in proving seams of good coal.

The coalfield of the Peace River valley is described elsewhere in the Report by Mr. Galloway, which indicates that, although the seams are thin, the coal is of exceptionally good quality.

The Groundhog coal field was visited by the writer during the summer, an account of which will be found on page 81 *et seq.* of this Report. The extent of the coalfield proved to be all that was claimed, but the quality of the seams as exposed in the openings seen in the southern end of the field was very disappointing. The field has only been tested in one part, and it seems quite probable that further prospecting will develop cleaner seams of coal; the number and thickness of the seams is all that could be desired.

The coalfields on the Bulkley, Telkwa, and Zymoetz rivers, near the line of Grand Trunk Pacific Railway east of Hazelton, have all been undergoing development, but it is as yet premature to say how important they may prove to be.

On the southern end of Graham island, on Skidegate inlet, a colliery (the British Pacific) has been partly equipped, but so far the output has been unimportant.

In the interior of Graham island to the east of the coal-outcrops at Camps Robertson and Wilson, systematic boring has been in progress all year, but without demonstrating workable coal. It would appear that the coal-measures had been laid down on a very uneven floor of igneous rock, many of the bosses of which were higher than the depth of the coal-deposit, so that they are now found protruding through: it was on one of these bosses that the first bore-holes happened to be put down. The work is to be continued this year in other spots.

Drilling has been going on in the northern part of the island near Masset, but no word has been received of commercial coal-seams having been proved.

But slight development has been done on the coal-area near Bear lake, in the Cariboo District.

On Vancouver Island the coalfield on Quatsino sound has been undergoing development in a small way, with as yet no definite results.

The large producing companies have all been quietly doing extensive development-work—the Canadian Collieries, near Campbell river and south of Cumberland, and it is understood much of this has been satisfactory, but details are not available for publication.

The Western Fuel Company has been engaged in opening a new shaft—the Reserve shaft—which will develop a new and very extensive seam of coal. Two shafts, each 10 x 26 inside of timbers and 350 feet apart, are being sunk; no expense or trouble which would tend to increase the safety or economy of future work is being spared in opening up this new colliery—a policy for which the present management has already acquired an enviable reputation.

The Pacific Coast Coal Mines, Limited, has continued the development of its Squash Colliery, and has this year mined about 4,500 tons of coal.

INSPECTION OF COAL-MINES, 1912.

VANCOUVER ISLAND AND COAST DISTRICT.

This district, comprising as it does, the coalfields of Vancouver Island and the Coast, as well as those of the Nicola and Similkameen valleys, has been subdivided, for inspection purposes, into three Inspection Districts, each under the charge of a District Inspector, as follows:—

NANAIMO INSPECTION DISTRICT.

THOMAS MORGAN, INSPECTOR (OFFICE, NANAIMO).

The collieries operating and producing coal during the year in this Inspection District, including the new mines that have been started, were:—

NANAIMO: The Western Fuel Company—No. 1 shaft, Protection shaft, and No. 4 shaft, Northfield mine, and sinking shafts at Reserve Colliery.

EXTENSION: The Canadian Collieries (Dunsmuir), Limited (formerly the Wellington Colliery Company)—Nos. 1, 2, and 3 mines, all worked from what is known as the No. 1 tunnel, and No. 4 mine, worked by a shaft.

Pacific Coast Coal Mines, Limited—Fiddick Colliery, South Wellington, Cranberry District, Nos. 1 and 2 slopes, and the new shafts at the Morden mine.

Vancouver-Nanaimo Coal Mining Company, Limited—New East Wellington Colliery, Mountain District, Nanaimo, No. 1 slope.

COMOX INSPECTION DISTRICT.

JOHN NEWTON, INSPECTOR (OFFICE, NANAIMO).

The collieries operating and producing coal during the year in this Inspection District, including the new mines that have been started, were:—

CUMBERLAND: The Canadian Collieries (Dunsmuir), Limited—Nos. 4 and 7 slopes, and Nos. 5 and 6 shafts, and two new shafts at No. 8.

Pacific Coast Coal Mines, Limited, Squash Colliery, Nos. 1 and 2 slopes, and shaft.

NICOLA-PRINCETON INSPECTION DISTRICT.

ROBERT STRACHAN, INSPECTOR (OFFICE, MERRITT).

The collieries operating during the year in this Inspection District, including the new mines, that have been started, were:—

NICOLA VALLEY: The Middlesboro Colliery of the Nicola Valley Coal and Coke Company, Merritt—Nos. 1, 2, 4, 5, and 6 mines.

Inland Coal and Coke Syndicate, Merritt—One shaft and slopes.

Diamond Vale Colliery Company, Merritt—No. 3 mine.

Pacific Coast Colliery Company, Merritt—No. 1 slope and No. 1 shaft, adjoining the Middlesboro Colliery.

PRINCETON: Princeton Coal and Land Company's Princeton Colliery.

United Empire Mining Company—One adit tunnel.

COALMONT: Columbia Coal and Coke Company, Limited—developing only.

The headquarters of the Inspectors of both the Nanaimo and Comox Inspection Districts is at Nanaimo, which permits of one of the Inspectors being constantly at headquarters while the other is making inspections; it also permits of the shifting of inspection duties, so that each Inspector knows both districts.

NANAIMO INSPECTION DISTRICT.

REPORT OF THOMAS MORGAN, INSPECTOR.

I have the honour to herewith submit my annual report for the collieries in my Inspection District for the year ending 31st December, 1912, together with a list of all accidents and the colliery returns.

The Western Fuel Company.

Head Office—San Francisco, Cal.

Capital, \$1,500,000.

Officers.

	<i>Address.</i>
John L. Howard, President or Chairman.	San Francisco, Cal.
Jas. B. Smith, Vice-President or Vice-Chairman.	San Francisco, Cal.
D. C. Norcross, Secretary,	San Francisco, Cal.
Joseph L. Schmidt, Treasurer,	San Francisco, Cal.
Thomas R. Stockett, General Manager,	Nanaimo, B.C.
Thomas McGuckie, Mine Manager,	Nanaimo, C.C.

The above company has operated the following collieries at Nanaimo during the past year, viz.: No. 1 or Esplanade shaft, Nanaimo; Protection Island mine, No. 4 Northfield mine, and the Douglas slope.

The following returns show the combined output of all the company's mines for the past year:—

RETURNS FROM WESTERN FUEL COMPANY'S MINES FOR YEAR 1912.

SALES AND OUTPUT FOR YEAR.	COAL.		COKE.	
	Tons.	Tons.	Tons.	Tons.
(Tons of 2,240 lb.)				
Sold for consumption in Canada	241,331			
" export to United States	177,933			
" " other countries	92,846			
Total sales		512,110		
Used in making coke				
Used under colliery boilers, etc.....	68,687			
Total for colliery use.....		68,687		
		580,797		
Stocks on hand first of year.....	5,411			
" last of year	1,411			
Difference taken from stock during year.....		4,000		
Output of collieries for year		576,797		

NUMBER OF HANDS EMPLOYED, DAILY WAGES PAID, ETC.

CHARACTER OF LABOUR.	UNDERGROUND.		ABOVE GROUND.		TOTALS.	
	No. employed.	Average Daily Wage.	No. employed.	Average Daily Wage.	No. employed.	Average Daily Wage.
Supervision and clerical assistance	25		22		47	
Whites—Miners	435				435	
Miners' helpers	29				29	
Labourers	451		22		473	
Mechanics and skilled labour	79		82		161	
Boys	52		23		75	
Japanese						
Chinese			131		131	
Indians						
Totals	1,071		280		1,351	

No. 1 SHAFT, ESPLANADE, NANAIMO.

Thomas McGuckie, Manager; John Hunt, Overman.

No. 1 shaft mine of the Western Fuel Company is located on the south end of the Esplanade, in the city of Nanaimo. It has been in operation for thirty years past, and has many years of productive capacity ahead. The present operations are at a depth of 600 to 1,200 feet below the surface, with a large portion of the workings under the sea. The hoisting-shaft is 18 feet in diameter and 640 feet deep, with an air-shaft 13 feet in diameter and the same depth. There is also a hoisting and ventilating shaft located on Protection island which has a depth of 650 feet, and also a hoisting and ventilating shaft on Newcastle island, 347 feet deep. Both of these shafts are connected with and are part of No. 1 mine. Mining is being carried on in both the Newcastle and Douglas seams.

The company has one of the most modern rescue-stations on the Pacific slope, fully equipped with apparatus; during the year sixty-three certificates of competency have been issued.

Rescue Apparatus on Hand.—Four 2-hour Draeger apparatus, four 2-hour Proto apparatus, three 1-hour apparatus, twelve storage-tanks, one oxygen stretcher. In addition to this, the Government has stored in the company's station four 2-hour Draeger apparatus fitted up with 1912 type helmet, four $\frac{1}{2}$ -hour Draeger apparatus fitted up with 1912 type helmet, pulmotor, oxygen-tanks, electric lamps, and a fully equipped rescue device.

A contract has been let by the Government, for the construction of a new rescue-station, which, when completed, will be the most modern and up-to-date rescue-station on the Pacific slope.

Newcastle Seam.—This seam is operated from No. 1 North level and is penetrated at three different points—namely, Nos. 1, 2, and 3 slopes. These slopes are sunk to a length of 3,000 feet and cover a large underground area.

Nos. 2 and 3 slopes are connected with one another, and No. 1 will be connected within two months, making one continuous face. No. 2 slope alone has over one mile of working-face, reaching from what is called the upper portion of the Big Incline section, below Protection shaft. Half of the output from these slopes comes from No. 2 slope. The coal varies from 3 to $3\frac{1}{2}$ feet in thickness and is of a very hard nature.

This seam is worked on the long-wall system ; mining-machines of the "pick quick" (or Bar machine) and puncher types are used and are well adapted to this seam. The Bar machine alone undercuts from 300 to 370 lineal feet, 6 feet deep in the eight hours. The haulage is done by electric motors of the trolley type.

During the year the ventilation system of the north side has been greatly improved. The main haulage being entirely on the intake air. The ventilation in the long-wall workings has been greatly improved by driving an upcast shaft through the rock to the Douglas seam, which greatly reduces the "drag" on the air.

Protection Shaft.

This shaft is used for lowering and hoisting all the men working on the north side of the No. 1 mine. A 2,500 cubic feet of air a minute compressor is installed for the purpose of supplying air for the cutting-machines and winches. The air is conveyed by a 7-inch air-line connecting with one of the same size from No. 1 shaft, making a complete circuit, so that if anything goes wrong with one compressor the mine does not suffer to any extent.

Pillars are being extracted in this mine for the purpose of supplying fuel for generating power for the machinery on the surface.

The ventilation of the mine is produced by a Guibal rope-driven force-fan, running seventy-two revolutions a minute and producing 90,000 cubic feet of air a minute, with a 1 $\frac{3}{4}$ -inch water-gauge ; size of fan, 9 x 18 feet, using 100 horse-power.

There is also an emergency exhaust-fan situated at the Newcastle shaft, in case of accident : this fan is always ready for use.

On my last inspection there was 70,000 cubic feet of air passing into this No. 1 level, divided into three splits.

No. 1 Slope.—There was 14,000 cubic feet of air a minute passing in this slope for the use of fifty-six men and six mules, or an average of nearly 190 cubic feet of air for each unit employed. No explosive gas found. The timbering and roadways were in good order.

No. 2 Slope.—There was 30,000 cubic feet of air a minute passing into this slope, divided into two splits.

North Side Split.—There was 12,000 cubic feet of air a minute passing into this split for the use of fifty men and eight mules, or an average of 162 cubic feet of air a minute for each unit employed.

South Side Split.—There was 12,250 cubic feet of air a minute passing into this split for the use of fifty men and seven mules, or an average of 172 cubic feet of air for each unit employed. No explosive gas found in this slope. The timbering and roadways were in good order.

No. 3 Slope.—There was 15,000 cubic feet of air a minute passing into this slope for the use of thirty-seven men and six mules, or an average of 272 cubic feet of air for each unit employed. No explosive gas found. The timbering and roadways were in good order.

Douglas Seam.

The workings on the Douglas seam forms the deepest workings of the No. 1 mine, and is reached by the Main and Diagonal slopes operated by main-and-tail and endless-rope systems.

During the past year the main and tail haulage was extended east a distance of 2,000 feet, and a new haulage-way is under construction to further extend this system northward to the Main slope, which will greatly increase the productive capacity of the south side and enable the present Diagonal slope to be used as the main return airway of the south side.

The portion of the main return airway paralleling the Main slope is being retimbered with steel "timbers" made of 56-lb. rails. If the experiment is successful, it will be continued so as to take in all the main air-courses.

On the surface, a second Sirocco fan has been installed and is used alternately with the original Sirocco fan; both are kept under steam so as to be ready for any emergency. These fans are 90 inches in diameter, of the double type, and are in every way modernly equipped for efficient work. The Protection head-frame was renewed by an entire new structure during the year.

This mine worked 301 days during the year, producing 434,522 tons, all of which was produced on the single-shift system of operating. Approximately 43 per cent. of the production was from the Douglas seam and 57 per cent. from the Newcastle seam.

The ventilation of this slope is produced by a Sirocco fan, rope-driven, ratio $3\frac{1}{2}$ to 1, size 90 inches, running 250 revolutions, producing 195,000 cubic feet of air a minute, with a 4-inch water-gauge; 225 horse-power.

When I made my last inspection there was 70,000 cubic feet of air a minute passing down the Diagonal slope, divided into three splits.

No. 1 Split.—There was 13,000 cubic feet of air a minute passing into this split for the use of twenty-five men and five horses, or an average of 325 cubic feet of air for the use of each unit employed. No explosive gas found. The timbering and roadways were in good order.

No. 2 Split.—There was 13,000 cubic feet of air a minute passing into this split for the use of thirty-seven men and five horses, or an average of 251 cubic feet of air a minute for each unit employed. No explosive gas found. The timbering and roadways were in good order.

No. 3 Split.—There was 15,000 cubic feet of air a minute passing into this split for the use of fifty-seven men and twelve horses, or an average of 161 cubic feet of air for each unit employed. No explosive gas was found. The timbering and roadways were in good condition.

Certificated Officials, No. 1 Shaft.—T. McGuckie, manager; J. Hunt and T. Jackson, overmen; R. Adam, J. Stubbard, E. Courtenay, J. Weeks, W. Johnson, T. Miles, R. W. Morton, E. Frances, W. Neave, J. Graham, J. Hamilton, and G. Bradshaw, firemen; J. Perry, J. Reid, J. Price, M. Woodburn, J. W. Jemson, D. John, J. Wallbank, and F. Green, shotlighters.

The following are the official returns from the No. 1 shaft and Protection Island collieries for the year 1912:—

SALES AND OUTPUT FOR YEAR.	COAL.		COKE.	
	Tons.	Tons.	Tons.	Tons.
(Tons of 2,240 lb.)				
Sold for consumption in Canada	224,589			
" export to United States	100,399			
" " to other countries	73,386			
Total sales		398,374		
Used in making coke				
" under colliery boilers, etc.	39,728			
Total for colliery use		39,728		
		438,102		
Stocks on hand first of year	4,941			
" last of year	1,361			
Difference taken from stock during year		3,580		
Output of colliery for year		434,522		

NUMBER OF HANDS EMPLOYED, DAILY WAGES PAID, ETC.

CHARACTER OF LABOUR.	UNDERGROUND.		ABOVE GROUND.		TOTALS.	
	No. employed.	Average Daily Wage.	No. employed.	Average Daily Wage.	No. employed.	Average Daily Wage.
		\$		\$		\$
Supervision and clerical assistance	15	.....	13	.....	28	.....
Whites—Miners	262	3.30 - 7.00	.....	.....	262	.....
Miners' helpers	24	2.86	.....	.....	24	.....
Labourers	305	2.86 - 3.30	15	2.75	320	.....
Mechanics and skilled labour	63	2.86 - 3.57	58	3.00 - 4.50	121	.....
Boys	38	1.10 - 2.45	17	.50 - 1.65	55	.....
Japanese . . . . .	.....	.....	.....	.....	.....	.....
Chinese . . . . .	.....	.....	83	1.50 - 1.88	83	.....
Indians (Natives of British Columbia) . . . . .	.....	.....	.....	.....	.....	.....
Totals	707	.....	186	.....	893	.....

Mine worked 301 days during the year.

NORTHFIELD MINE, NANAIMO COLLIERY.

J. W. Montgomery, Manager.

Thos. Reid, Overman; Wm. Roper, John Sullivan, Thos. Parkinson, George Yarrow, Robert Russell, Jack White, Archie McBroom, Jas. Richard, and Ed. Devlin,
Firemen and Shotlighters.

This mine has worked continuously during the year and is an important producer, as shown by the returns. The workings are in the Upper and Lower seams, and have good coal all over. The travelling-road into the mine is by a slope from the surface, with an easy grade, which is lighted nearly all the way down by electricity, as is also the slope. The hoisting is done through a shaft 60 feet deep, from the bottom of which a slope extends about a mile, passing under Exit passage and Newcastle island, to where the coal is being mined. The coal is hauled up the slope by an endless-rope system to the shaft-bottom, where it is hoisted to the surface; the workings of this slope are designated Right or Left levels: to the right of the slope there were Nos. 2 and 3 levels, but now there is only No. 3, as No. 2 level is finished; to the left, where there were Nos. 3, 4, 5, and 6 levels, now there are only Nos. 3, 4, and 5; these are all working at the present time. The mining in this Lower seam is all long-wall, and it also is in the top Upper seam. The coal is from 30 to 40 inches thick in the Lower seam and from 5 to 7 feet thick in the Upper seam, and is of very good quality. On my visit to the mine on December 2nd and 3rd, I found the conditions good, well timbered, and cogged. For the use of fifty-five men and five mules in No. 3 Right level, there was 11,500 cubic feet of air a minute; for the use of fifty-two men and five mules in No. 3 Left level, there was 10,000 cubic feet a minute; for the use of sixty-eight men and eight mules in Nos. 4 and 5 Left levels, there was 13,000 cubic feet a minute; for the use of seventeen men and two mules in the Top seam, there was 5,000 cubic feet a minute. Total air around the workings was 39,500 cubic feet a minute; total air at the fan-shaft in the return was 60,000 cubic feet a minute, leaving 20,500 cubic feet for leakage through doors, stoppings, and old workings. Fan makes 110 revolutions a minute, with a 2-inch water-gauge.

The following are the official returns of the Northfield Colliery for the year ending the 31st December, 1912:—

SALES AND OUTPUT FOR YEAR. (Tons of 2,240 lb.)	COAL.		COKE.	
	Tons.	Tons.	Tons.	Tons.
Sold for consumption in Canada	16,694			
" export to United States	77,534			
" " to other countries	19,397			
Total sales		113,625		
Used in making coke				
" under colliery boilers, etc.	28,323			
Total for colliery use		28,323		
		141,948		
Stocks on hand first of year	470			
" last of year	50			
Difference taken from stock during year		420		
Output of colliery for year		141,528		

NUMBER OF HANDS EMPLOYED, DAILY WAGES PAID, ETC.

CHARACTER OF LABOUR.	UNDERGROUND.		ABOVE GROUND.		TOTALS.	
	No. employed.	Average Daily Wage.	No. employed.	Average Daily Wage.	No. employed.	Average Daily Wage.
		\$		\$		\$
Supervision and clerical assistance	8		8		16	
Whites—Miners	156	3 30 - 5 50			156	
Miners' helpers	5	2 86			5	
Labourers	141	2 86 - 3 30	6	2 75	147	
Mechanics and skilled labour	16	2 86 - 3 57	20	3 00 - 4 00	36	
Boys	14	1 10 - 2 20	6	1 00 - 2 25	20	
Japanese						
Chinese			38	1 50 - 1 88	38	
Indians (Natives of B.C.)						
Totals	340		78		418	

Mine worked 300 days in the year.

DOUGLAS MINE OF THE WESTERN FUEL COMPANY.

George Bradshaw, Manager; John White, Fireman.

This mine is a slope-opening in the Newcastle seam, and is located on Chase river, just south of the city of Nanaimo. It was started March 1st, 1911. This slope was down 1,700 feet, and the counter-slope was down 1,600 feet; size of the slope is 11 x 6 feet, and the counter-slope is the same. Motive power for ventilation is a fire-grate, but a fan of the Sirocco type has been installed, and is ready to start at any moment if necessary. The roof in this slope is good hard rock. The slopes are well timbered from the top to the bottom with sets. For the use of nine men, there was 11,760 cubic feet of air a minute going down the slope at the time of my inspection.

The mine was worked in a small way during the first four months of the year, when it was temporarily abandoned.

The following are the official returns from the Douglas mine of the Western Fuel Company for the year 1912 :—

SALES AND OUTPUT FOR YEAR.	COAL.		COKE.	
	Tons.	Tons.	Tons.	Tons.
(Tons of 2,240 lb.)				
Sold for consumption in Canada	48			
" export to United States				
" " other countries	63			
Total sales		111		
Used in making coke				
Used under colliery boilers, etc.	636			
Total for colliery use		636		
		747		
Stocks on hand first of year				
" last of year				
Difference { added to } stock during year				
{ taken from }				
Output of collieries for year		747		

NUMBER OF HANDS EMPLOYED, DAILY WAGES PAID, ETC.

CHARACTER OF LABOUR.	UNDERGROUND.		ABOVE GROUND.		TOTALS.	
	No. employed.	Average Daily Wage.	No. employed.	Average Daily Wage.	No. employed.	Average Daily Wage.
Supervision and clerical assistance	2	\$	1	\$	3	
Whites—Miners	17	4.50			17	
Miners' helpers						
Labourers	5	2.86 - 3.30	1	2.75	6	
Mechanics and skilled labour			4	3.00 - 4.00	4	
Boys						
Japanese						
Chinese			10	1.50	10	
Indians						
Totals	24		16		40	

Mine worked seventy-six days during January, February, and March, and during April was temporarily abandoned.

RESERVE MINE.

This is a new shaft mine being opened by the Western Fuel Company in the Cranberry District near the centre of a 2,500-acre virgin coalfield in Nanaimo and Cranberry Districts, the main shaft being located about 1,700 feet east of Nanaimo river.

The first sod was turned in July, 1910. The mine is being opened by two shafts (Main and Auxiliary), which are to be sunk to the Douglas seam, a depth of approximately 1,000 feet. The shafts are 350 feet apart and are rectangular in shape, each being 10 x 26 feet

inside of timbers, and divided into three compartments, two hoisting and an air compartment 10 x 10 feet. On December 31st, 1912, the Main shaft was down 820 feet and the Auxiliary shaft was down 528 feet; if nothing interferes, it is expected the coal will be struck in the Main shaft early in March, 1913.

Both shafts are being equipped on the most modern and approved system and are being sunk with the latest appliances, the shafts being lighted with electric lights and ventilated with small exhaust Sirocco fans direct-driven with upright engines. The temporary hoisting-engines have been replaced by modern hoisting-engines of Scotch make, equipped with Corliss valves and all the latest improvements for controlling the hoisting and preventing overwinding. The engine at the Main shaft has cylinders 30 x 60 inches and two drums 14 feet in diameter; the engine at the Auxiliary shaft has cylinders 24 x 54 inches, with two drums 12 feet in diameter. Both engines are set in heavy concrete foundations and are enclosed in substantial and well-lighted iron-clad houses. The power-house contains a Canadian Rand compressor of 2,500 cubic feet capacity, and provision has been made for a duplicate compressor when required. Two electric-lighting plants have also been installed, one of the steam-turbine type.

The boiler-house contains two 84-inch x 16-foot return-tubular boilers of British Columbia manufacture, and provision has been made for installing four additional boilers of same type, two of which will be installed during March.

The machine and blacksmith shop has been equipped with modern tools, and also a drill-sharpener for sharpening the drills used in shaft-sinking.

An office and supply building has been erected, and later on a safety-lamp building will be erected. In addition to these buildings, there is a wash-house equipped with hot and cold-water baths and showers and a dry-room and change-room for the use of the shaft-sinkers.

Provision has been made for the installation of a double 90-inch Sirocco fan, the fan being now en route, and will be ready for use before the two shafts are connected underground.

The permanent head-frames for both shafts and the tippie building, with yard-tracks, will be erected during the early spring and summer.

The railway connecting this mine with the shipping wharves of the company on Nanaimo harbour is completed up Nanaimo river, at which point a two-span Howe-truss bridge is being erected and will be ready for use early in February.

Both the surface and underground plans call for equipping and developing the mine on the most modern lines, and with an ultimate capacity of 1,500 to 2,000 tons a day. It is expected the production will be from 500 to 1,000 tons a day by the end of 1913, and the maximum capacity will be reached during 1914.

Canadian Collieries (Dunsmuir), Ltd.

Head Office—Victoria, B.C.

Capital, \$15,000,000.

<i>Officers.</i>	<i>Address.</i>
Sir William Mackenzie, President,	Toronto, Ont.
A. D. McRae, Vice-President,	Vancouver, B.C.
R. P. Ormsby, Secretary,	Toronto, Ont.
A. J. Mitchell, Treasurer,	Toronto, Ont.
C. F. Compton, Asst. Secretary,	Victoria, B.C.
W. L. Coulson, General Manager,	Victoria, B.C.

The Canadian Collieries (Dunsmuir), Limited, during the year 1911 acquired all the holdings of the Wellington Collieries Company, Limited, and has been operating the following mines during the past two years under the general management of W. L. Coulson:—

The Extension Colliery, in the Cranberry District (Extension); J. H. Cunningham, manager.

The Union Colliery, in Comox District; R. Henderson, J. H. McMillan, T. A. Spruston, managers at the several mines.

NOTE.—This latter colliery is in the Inspection District of Inspector Newton, in whose report will be found a description of the property and the details of production.

The following table shows the combined output of all this company's collieries during the past year:—

RETURNS FROM CANADIAN COLLIERIES MINES FOR YEAR 1912.

SALES AND OUTPUT FOR YEAR.	COAL.		CORE.	
	Tons.	Tons.	Tons.	Tons.
(Tons of 2,240 lb.)				
Sold for consumption in Canada.....	426,493		4,266	
" export to United States	102,818			
" " other countries.....	15,311			
Total sales.....		544,622		4,266
Lost in washing.....	164,854			
" under colliery boilers, etc.....	54,174			
Total for colliery use.....		219,028		
		763,650		
Stocks on hand first of year.....	24,953		6,636	
" last of year.....	2,872		2,370	
Difference taken from stock during year.....		22,081		4,266
Output of colliery for year.....		741,569		Nil.

NUMBER OF HANDS EMPLOYED, DAILY WAGES PAID, ETC.

CHARACTER OF LABOUR.	UNDERGROUND.		ABOVE GROUND.		TOTALS.	
	No. employed.	Average Daily Wage.	No. employed.	Average Daily Wage.	No. employed.	Average Daily Wage.
Supervision and clerical assistance	47	.....	22	.....	69	.....
Whites—Miners	680	.....	.....	.....	680	.....
Miners' helpers	319	.....	.....	.....	319	.....
Labourers	60	.....	149	.....	209	.....
Mechanics and skilled labour	53	.....	140	.....	193	.....
Boys	59	.....	17	.....	76	.....
Japanese miners	55	.....	.....	.....	55	.....
" labourers	46	.....	16	.....	62	.....
Chinese miners	85	.....	.....	.....	85	.....
" labourers	137	.....	194	.....	331	.....
Totals	1,541	.....	538	.....	2,079	.....

EXTENSION COLLIERY.

J. H. Cunningham, Manager.

The general supervision of all the mines of this colliery are entrusted to J. H. Cunningham, who has an overman in charge of each separate mine.

No. 1 OR TUNNEL MINE.

Robert Bonar, Overman ; Evan John, Wm. Gilchrist, John Davidson,
David Morrison, and James Strang, Firemen and Shotlighters.

Most of the mining done at this colliery is "pillar and stall" and the extraction of pillars. There is a little long-wall work in the 1st level, left of the slope, the work being all to the dip of the tunnel level. There are three levels to the right and to the left of the slope. I may say that I visited this mine every month and found all in good order, well timbered and cogged, and the ventilation good. This mine has not been worked since September 18th last, owing to labour trouble, but the firemen are in the mine all the time, and the fan is kept going right along. On my last inspection, when the men were in the mine, in September, there was 15,000 cubic feet of air a minute going through the district for the use of forty-five men and four mules ; on December 18th there was 12,250 cubic feet going through to keep them clear : the total air at the fan-shaft was 22,000 cubic feet, with a water-gauge of $\frac{3}{4}$ inch.

No. 2 MINE, EXTENSION.

Wm. James, Overman ; Hugh Fulton, David Davidson, Arthur Smith, Harry Mitchell,
Samuel McLochlan, Wm. Simpson, Wm. Clifford, David Gordon, Wm. Bradley,
Thos. Strang, Wm. Cosier, and James Nimmo, Firemen and Shotlighters.

No. 1 District, or Old Slope.—This mine is entered by a rock tunnel about a mile long. There are two slopes in this mine sunk from the motor-road, by which the coal is gathered together to make a trip for the motor to take out of the tunnel to the tippie. The Old No. 2 slope comes out on the hill above the tunnel, and the men and mules can go out that way if

necessary. The ventilating-fan is on the hill near the slope over this airway. This No. 2 slope goes down past the inside end of the tunnel to the basin of the coalfield from which the coal is being taken. The mining is done by pillar and stall and by extraction of pillars; there was also a little long-wall done in the mine when it was working, but the mine has not worked since September 18th; a few men are working in No. 2 West level, off the Old slope, to take some coal out to feed the boilers for running the fan. On my visit to this mine on December 17th, there was 8,400 cubic feet of air a minute for the use of eight men and one mule in No. 2 West level; at the mouth of the Old slope there was 16,000 cubic feet a minute going down; on the left side of the Old slope there was 14,000 cubic feet a minute going through to keep the mine clear. No work was going on.

No. 3 District of No. 2 Mine, or No. 4 Motor Level, East District.—It is nearly all pillar-and-stall work in this district, with a little narrow work up No. 21 incline; all the balance is long-wall. At present there is no work going on here, but the air is kept circulating around the workings. On December 17th there was 14,000 cubic feet a minute going through the district; the total air at the fan-shaft was 80,000 cubic feet, with a 2-inch water-gauge.

NO. 3 MINE, EXTENSION.

David McKinnel, Overman; James Glen, John Ross, Wm. Bauld, James Nelson,
George Smith, John Barclay, Dan Campbell, and Pat Malone,
Firemen and Shotlighters.

This mine is the continuation of No. 4 West level from the rock tunnel. The method of working in the mine is the pillar and stall and the extraction of pillars. All working to the rise of No. 4 level is extraction of pillars. There is a lot of pillar coal in this district, and the coal varies in thickness from about 5 to 12 feet. There are two connections upwards from this mine to the surface, from No 4 North level. The Old slope goes right through to the surface and is the airway to the fan. The ventilation was good all through the district. For the use of twenty-five men and three horses, there was 16,000 cubic feet a minute going through the High Line district; there was 14,000 cubic feet a minute circulating for the use of forty-five men and six mules in the Slope district when the mine was working in September, but the mine has not worked since September 18th owing to labour trouble. The total air at the fan-shaft was 57,000 cubic feet, with a water-gauge of $1\frac{3}{4}$ inches.

NO. 4 MINE, EXTENSION.

Thos. Mills, Overman; John McMurtrie, Tom Mordy, Wm. Reid, James Glenn,
and Dan Fagan, Firemen and Shotlighters.

This mine has not been working since August 1st, when the company closed the mine down for some reason. The hoisting-shaft is down 290 feet; it used to be both downcast and upcast, but the upcast shaft has been finished and the fan moved to that shaft, which is now used for the upcast; it is 290 feet deep and is 8 x 16 feet. This mine is about one and one-half miles to the south from the Extension tunnel. It was extended quite a bit during the year, and was kept in good order all through. On my visit to the mine on August 1st, I found the workings in good order, well timbered all through, and the ventilation good. For the use of thirty-four men and three mules on the east side, there was 12,000 cubic feet a minute; for the use of twenty-four men and one mule on the west side, there was 14,000 cubic feet a minute; for the slope, not working, there was 13,750 cubic feet a minute.

The following are the official returns of the Extension Colliery for the year ending the 31st December, 1912 :—

SALES AND OUTPUT FOR YEAR. (Tons of 2,240 lb.)	COAL.		COKE.	
	Tons.	Tons.	Tons.	Tons.
Sold for consumption in Canada	157,473			
" export to United States	45,141			
" " other countries				
Total sales		202,614		
Lost in washing	50,608			
" under colliery boilers, etc.	13,918			
Total for colliery use		64,526		
		267,140		
Stocks on hand first of year	1,465			
" last of year	91			
Difference taken from stock during year		1,374		
Output of colliery for year		265,766		

NUMBER OF HANDS EMPLOYED, DAILY WAGES PAID, ETC.

CHARACTER OF LABOUR.	UNDERGROUND.		ABOVE GROUND.		TOTALS.	
	No. employed.	Average Daily Wage.	No. employed.	Average Daily Wage.	No. employed.	Average Daily Wage.
Supervision and clerical assistance	4	\$ 4.00 - 6.00	14	\$ 3.50 - 6.00	18	
Whites—Miners	375	3.50 - 5.00			375	
Miners' helpers	258	2.75 - 3.30			258	
Labourers			7	2.75 - 3.02	7	
Mechanics and skilled labour	15	2.75 - 3.02	48	2.75 - 4.40	63	
Boys	38	1.10 - 2.20	5	1.10 - 2.20	43	
Japanese			4	1.50	4	
Chinese	8	1.50 - 1.65	86	1.35 - 1.75	94	
Indians						
Totals	698		164		862	

Name of seams or pits—Wellington, Nos. 1, 2, 3, and 4.

Description of seams, tunnels, levels, shafts, etc., and number of same—One tunnel connecting Nos. 1, 2, and 3 mines : No. 4 shaft situated one mile south of the tunnel.

Pacific Coast Coal Mines, Limited.

Head Office—Victoria, B.C.

Capital, \$2,000,000.

Officers.

C. C. Michener, President,
Luther D. Wishart, Vice-President,
J. F. Mosby, Secretary,
G. R. Hughes, Treasurer,
George Wilkinson, Superintendent,

Address.

Victoria, B.C.
New York.
Victoria, B.C.
Victoria, B.C.
Nanaimo, B.C.

Value of plant, \$424,226.

This is a recently organized company and includes in its holdings the Fiddick Colliery of the former South Wellington Mines, Limited, and certain property at Suquash, on the east coast of Vancouver Island, near Malcolm island, where the company has, within the past two years, opened up a new colliery, which is now producing coal. The output of coal made by the company from these two collieries combined during the year 1912 is shown in the following table :—

SALES AND OUTPUT FOR YEAR. (Tons of 2,240 lb.)	COAL.		COKE.	
	Tons.	Tons.	Tons.	Tons.
Sold for consumption in Canada	111,504			
" export to United States	6,992			
" " other countries				
Total sales		118,496		
Lost in washing	6,879			
Used under colliery boilers, etc.	17,384			
Total for colliery use		24,263		
		142,759		
Stocks on hand first of year	33,185			
" last of year	42,015			
Difference added to stock during year		8,830		
Output of colliery for year		151,589		

NUMBER OF HANDS EMPLOYED, DAILY WAGES PAID, ETC.

CHARACTER OF LABOUR.	UNDERGROUND.		ABOVE GROUND.		TOTALS.	
	No. employed.	Average Daily Wage.	No. employed.	Average Daily Wage.	No. employed.	Average Daily Wage.
Supervision and clerical assistance .	12		7		19	
Whites—Miners	112				112	
Shaft sinkers	45				45	
Labourers	43		17		60	
Mechanics & skilled labour.	30		36		66	
Boys	9		4		13	
Japanese						
Chinese			50		50	
Indians						
Totals	251		114		365	

FIDDICK COLLIERY, SOUTH WELLINGTON.

George Wilkinson, General Manager; Harry Devlin, Mine Manager.

SOUTH WELLINGTON MINE, NOS. 1 AND 2 SLOPES.

This mine is situated about four miles south of Nanaimo, in Cranberry District, and is worked from two slopes, No. 1 on the Fiddick Estate and No. 2 on the Richardson Estate. No. 1 slope is now down 2,550 feet and No. 2 slope about 1,300 feet. Coal is being mined in No. 1 slope from Nos. 2 and 3 North levels, and from Nos. 1 and 2 South levels and No. 2 North.

The method of working is pillar and stall, but in some places where the coal is thin it is mined on the long-wall system. The coal averages from 3 feet to 28 feet in thickness. The ventilation is produced by a Sheldon single entry reversible fan $9\frac{1}{2}$ feet in diameter, driven by a $9\frac{1}{2} \times 14$ steam-engine, direct-connected, and is capable of producing 85,000 cubic feet of air a minute, with a $1\frac{1}{2}$ -inch water-gauge.

The coal is hauled from the two slopes by a double-drum, friction haulage-engine. The slopes are electric-lighted, with a 16-candle power lamp every 25 feet. The coal from the two slopes is emptied into the same tippie, which is capable of handling 1,500 tons a day. The cars are dumped by a Phillips crossover dump. The tracks are so arranged that handling of the cars are nearly automatic, requiring very little labour. The power for the mine is generated by three 100-horse-power return-tubular boilers.

The power-house contains one Canadian Rand straight-line air-compressor, capacity 480 cubic feet of air a minute; one Norwalk air-compressor, simple steam compound, with a capacity of 707 cubic feet of air a minute; the first unit of a cross-compound Rand air-compressor, total capacity 21,000, present capacity 850 cubic feet a minute. These compressors furnish power for winches and pumps underground. The power-house also contains an electric unit, a 50-kw. generator A.C., with 25 horse-power D.C. exciter attached; these are driven by a steam-engine 9×16 inches.

In connection with the mine there is a large stable with accommodation for thirty horses; all the horses are brought out of the mine at the end of each shift.

At the mine there are fifteen dwelling-houses and a boarding-house, also offices, a store and supply-house. In connection with the mine there is seven miles of standard-gauge railroad by which the coal is conveyed to Boat harbour, the shipping point. Two locomotives and thirty Hart-Otis 40-ton capacity and twenty-five hopper-bottomed 30-ton capacity cars are in use. At Boat harbour bunkers of 4,000 tons capacity are erected. The loading is done with a rubber conveyor-belt with a capacity of 750 tons an hour.

The following are the official returns of the Fiddick Colliery for the year ending the 31st December, 1912:—

SALES AND OUTPUT FOR YEAR.	COAL.		COKE.	
	Tons.	Tons.	Tons.	Tons.
(Tons of 2,240 lb.)				
Sold for consumption in Canada	108,479			
" export to United States	6,991			
" " other countries				
Total sales		115,470		
Lost in washing	6,879			
Used under colliery boilers, etc.	16,699			
Total for colliery use		23,578		
		139,048		
Stocks on hand first of year	33,185			
" last of year	41,234			
Difference added to stock during the year		8,049		
Output of colliery for year		147,097		

NUMBER OF HANDS EMPLOYED, DAILY WAGES PAID, ETC.

CHARACTER OF LABOUR.	UNDERGROUND.		ABOVE GROUND.		TOTALS.	
	No. employed.	Average Daily Wage.	No. employed.	Average Daily Wage.	No. employed.	Average Daily Wage.
		§		§		§
Supervision and clerical assistance	10		5		15	
Whites—Miners	102	3.30 - 6.00			102	3.30 - 6.00
Miners' helpers						
Labourers	41	2.25 - 2.85			41	2.25 - 2.85
*Mechanics and skilled labour	30	2.85 - 3.30	19	2.75 - 3.60	49	2.75 - 3.60
Boys	9	1.25 - 2.25	4	1.00	13	1.00 - 2.25
Japanese						
Chinese			40	1.50 - 1.75	40	1.50 - 1.75
Indians						
Totals	192		68		260	

*NOTE.—Skilled labour underground includes timbermen, trackmen, bratticemen, pumpmen, pipemen; above ground, machinists, blacksmiths, engineers, railroad train crew, washery and loading staff, lampmen, stablemen; supervision and clerical assistance includes mine manager, overmen, firebosses, shotlighters, and clerical staff; labourers includes drivers, pushers, rope-riders, etc.

Name of seams or pits—Douglas seam; No. 1 slope (Fiddick); No. 2 slope (Richardson).

Description of seams, tunnels, levels, shafts, etc., and number of same—Two slopes, two levels, and one shaft 10 x 12, making five outlets to surface. Coal has been mined this year in No. 1 slope from Nos. 3 and 4 West levels, Nos. 1, 2, and 3 North levels, and Nos. 1 and 2 South levels. The coal averages from 3 to 28 feet in thickness. Coal has been mined this year in No. 2 slope from Nos. 4, 5, and 6 South levels and from No. 2 North level.

Description and length of tramway, plant, etc.—At this mine the plant consists of three return-tubular boilers, 100 horse-power each; three air-compressors (1 Canadian Rand, capacity 500 cubic feet a minute; one Norwalk, 707 cubic feet a minute; the first unit of a Canadian Rand cross-compound, 800 feet a minute); one 50-kw. A.C. generator, with 25-horse-power D.C. exciter attached, and 9 x 14 steam-engine for driving same; two Fairbanks-Morse pumps for supplying water to boilers, 7 x 5 12 duplex; Cockrane feed-water heater and purifier; one thoroughly equipped tippie, capacity 1,500 tons a day; one thoroughly equipped machine-shop; double-drum hoisting-engine for hauling coal from slopes, 200-horse-power; one Sheldon fan capable of producing 85,000 feet of air, with 1½ inches of water-gauge; one mine-rescue station containing two 2-hour apparatus and one ½-hour apparatus, with necessary supplies and equipment for recharging. Underground plant consists of two winches 6½ x 8, two 5 x 7, one 5 x 8, and one 9 x 11 inches. Pumps, one 300-gallon electric-turbine pump; one 600-gallon Cameron piston-pump; two Fairbanks-Morse pumps, duplex, one 5¼ x 3½ x 5 and one 7 x 5 x 7; and three small duplex pumps, one 3 x 2 x 5 and two 4 x 3 x 6; 250 mine-cars, and approximately ten miles of narrow-gauge track in mine.

MORDEN COLLIERY, SOUTH WELLINGTON.

MORDEN MINE, NOS. 3 AND 4 SHAFTS.

Joseph Foy, Overman

This is a new mine being opened up by the same company on Section 11, Range 8, Cranberry District, two miles east of South Wellington. Two shafts are being sunk, the main shaft 9 x 16 and the air-shaft 9 x 12 on the clear; these shafts were started in March. The hoisting-shaft is now down about 550 feet and the air-shaft about 450 feet. Coal is expected to be reached by the end of the year. The shafts are timbered solid with 6 x 12 sized lumber, with 10 x 12 bearing sets; buntons are put in with 6-foot centres. The hoisting is accomplished by buckets of 1-ton capacity. Doors are used in the shaft which automatically close after the loaded bucket passes through, so that nothing can fall down the shaft. After the bucket reaches the surface it is swung clear of the shaft by the bull chain and dumped down a chute into the railroad-cars.

Canadian Rand rock-drills are used for drilling, "Little Giants" $3\frac{1}{4}$ cylinders and "New Shippers" $3\frac{1}{8}$ cylinders. Power is furnished for these by an Ingersoll straight-line compressor.

Steam is furnished by two 100-horse-power return-tubular boilers. The hoisting is done by two engines, one 16 x 32 direct-acting, with 5-foot drum; the other a 10 x 18 geared hoist, 4-foot drum.

The plant is electric-lighted and cluster lights are suspended in the shaft just above the sinkers, which makes ideal conditions. The blasting is done by electricity, primers being used. The shots are fired from the power-house after all men are out of the shafts.

This mine will be equipped with the most modern machinery, to handle an output of 1,500 tons a day of nine hours.

No. 1 MINE OF P.C.C.

H. Devlin, Manager; J. Ovington, Overman; A. Manifold, M. Stafford, and R. Rallison, Firemen.

The company has built a small rescue-station with a fully equipped rescue apparatus consisting of four 2-hour Draeger oxygen apparatus, and has a fully trained staff of workmen ready in case of an emergency. The ventilation is produced by a reversible Sheldon fan making 150 revolutions a minute, with a $\frac{3}{4}$ -inch water-gauge, producing 50,000 cubic feet of air a minute.

When I made my last examination there was 27,000 cubic feet of air a minute passing into this mine, divided into two splits.

No. 1 Split.—There was 9,000 cubic feet of air a minute passing into this section of the mine for the use of eighteen men and one horse, or an average of nearly 300 cubic feet of air a minute. No explosive gas found in this mine. The timbering and roadways were in good order.

No. 2 Split.—There was 12,000 cubic feet of air a minute passing into this split for the use of seventeen men and two horses, or an average of 521 cubic feet of air for each unit employed.

No. 2 MINE.

J. Neen, J. Black, and F. Hilley, Firemen ; G. Moore, and A. Bryden, Shotlighters.

I examined all parts of this mine and found the following conditions : There was 27,500 cubic feet of air a minute passing into this mine for the use of forty-four men and six mules, or an average of 490 cubic feet for each unit employed. No explosive gas found in this mine. The timbering and roadways were in good condition.

This mine is only being opened up and no output has yet been made.

NUMBER OF HANDS EMPLOYED, DAILY WAGES PAID, ETC.

CHARACTER OF LABOUR.	UNDERGROUND.		ABOVE GROUND.		TOTALS.	
	No. employed.	Average Daily Wage.	No. employed.	Average Daily Wage.	No. employed.	Average Daily Wage.
		\$		\$		
Supervision and clerical assistance.....	1	.....	1	.....	2	.....
Whites—Miners, shaft-sinkers.....	45	.....			45	.....
Miners' helpers.....		.....				.....
Labourers.....		.....	14	.....	14	.....
Mechanics and skilled labour....		.....	15	.....	15	.....
Boys.....		.....				.....
Japanese.....		.....				.....
Chinese.....		.....	10	.....	10	.....
Indians.....		.....				.....
Total.....	46	.....	40	.....	86	.....

Description of seams, tunnels, levels, shafts, etc., and number of same—Two shafts in course of being sunk—hoisting-shaft, 9 x 16 in the clear ; air-shaft 9 x 12 in the clear.

Description and length of tramway, plant, etc.—Two return-tubular boilers, 100 horse-power each ; two hoisting-engines for hoisting rock out of shafts ; two Ingersoll Rand air-compressors for furnishing air for rock-drills ; five rock-drills ; two Cameron sinking pumps ; one boiler-feed pump.

The Vancouver-Nanaimo Coal Mining Co., Ltd.

Head Office—Vancouver, B.C.

Capital, \$1,000,000.

<i>Officers.</i>	<i>Address.</i>
Alvo. V. Alvensleben, President,	744 Hastings Street, Vancouver, B.C.
H. W. Maynard, Vice-President,	98 Powell Street, Vancouver, B.C.
Willibald Imhoff, Secretary-Treasurer,	744 Hastings Street, Vancouver, B.C.
H. N. Freeman, Superintendent,	P.O. Box 283, Nanaimo, B.C.

Value of plant, \$500,000.

NEW EAST WELLINGTON COLLIERY.

Harry N. Freeman, Manager; J. Dixon, Overman; W. H. Moore, R. Reid, and J. Saunders, Firebosses; N. Bevis, J. E. Knowles, J. Bennie, W. Reid, I. Nash, and J. Nicholson, Shotlighters.

This mine is situated about two miles from Nanaimo and is known as the Old Wellington seam. The mine is opened from the surface by two slopes running N. 70° E. and pitching about 35 degrees, and is down a distance of 1,400 feet. At this point two main headings are turned off N. 65° E., and one up a distance of 1,400 feet. Levels are turned off these headings every 200 feet, the coal ranging from 4 to 8 feet in thickness.

The stalls in this section are worked on the pillar-and-stall system, with 20-foot stalls and 60 x 120-foot pillars. On the north side the coal varies 1 to 4 feet and is worked on the long-wall system, a very satisfactory method. The coal is of a very hard nature and free from impurities. All coal is hand-mined; 30-per-cent. giant powder is used. All shots are fired by batteries.

The hoisting plant consists of a direct-haulage 10 x 12 Washington hoist. The coal is screened over a Marcus screen. The power plant consists of two return-tubular boilers, 68 horse-power; a new 100 horse-power boiler is being installed; a Canadian Rand compressor, capacity of 750 feet of free air.

This mine is connected by two miles of railway to a shipping point situated on Newcastle townsite; the railway also connects with the E. & N. Railway.

The coal is dumped into bunkers having a capacity of 1,000 tons, from which it is conveyed to ships by a self-acting incline.

The ventilation of this mine is produced by a Sheldon fan, 4 x 9, driven by a 10 x 12 Sheldon engine, producing 30,000 cubic feet of air a minute, with a 2½-inch water-gauge.

When I made my last inspection there was 30,000 cubic feet of air a minute passing into this mine, divided into two splits.

No. 1 Split.—There was 7,500 cubic feet of air a minute passing into this split for the use of thirty men and one mule, or an average of 237 cubic feet of air for each unit employed. No. explosive gas found in the mine. The timbering and roadways were in good order.

No. 2 Split.—There was 18,000 cubic feet of air a minute passing into this split for the use of fifty men and six mules, or an average of 264 cubic feet of air for each unit employed.

The following are the official returns from the New East Wellington Colliery for the year 1912:—

SALES AND OUTPUT FOR YEAR.	COAL.		COKE.	
	Tons.	Tons.	Tons.	Tons.
(Tons of 2,240 lb.)				
Sold for consumption in Canada	66,770			
" export to United States	15,930			
" " to other countries				
Total sales		82,700		
Used in making coke				
Used under colliery boilers, etc.	5,112			
Total for colliery use		5,112		
		87,812		
Stocks on hand first of year	400			
" last of year	841			
Difference added to stock during year		441		
Output of colliery for year		88,253		

NUMBER OF HANDS EMPLOYED, DAILY WAGES PAID, ETC.

CHARACTER OF LABOUR.	UNDERGROUND.		ABOVE GROUND.		TOTALS.	
	No. employed.	Average Daily Wage.	No. employed.	Average Daily Wage.	No. employed.	Average Daily Wage.
Supervision and clerical assistance	8	3.57	5		13	
Whites—Miners	100	5.00			100	5.00
Miners' helpers						
Labourers	50	2.86			50	2.86
Mechanics and skilled labour	1	3.30	6	3.50	7	3.40
Boys	2	1.50			2	1.50
Japanese						
Chinese			15	1.65	15	1.65
Indians						
Totals	161	3.25	26	2.57	187	2.90

Name of seams or pits—New East Wellington mine, Nanaimo, B.C., working the Old Wellington seam.

Description of seams, tunnels, levels, shafts, etc., and number of same—The mine is entered by a slope, the bottom of which touches the seam, and from here the workings start. There are two haulage-roads, one running almost due east and one west from the slope-bottom.

Description and length of tramway, plant, etc.—Tramways run down the length of the slope and in and about the various crosscuts and haulage-roads in the mine. The mine is operated by steam, and there is one small dynamo used for lighting the surface works, down the slope, and about the vicinity of the slope-bottom. The mine is ventilated mechanically.

Oyster Harbour Collieries (Limited), (N.P.L.).

Some prospecting has been done at Oyster Harbour, about four miles from Ladysmith, by the side of the E. & N. Railway, by putting down a shaft about 110 feet. It has been standing about five months and nothing done since. E. P. White was looking after the sinking.

NORTHERN DISTRICT OF VANCOUVER ISLAND.

REPORT OF JOHN NEWTON, INSPECTOR.

I beg to submit my report as Inspector of Mines for the Northern District of Vancouver Island for the year 1912.

Canadian Collieries (Dunsmuir), Ltd.*

These mines were formerly operated by the Wellington Colliery Company, but were taken over by the Canadian Collieries (Dunsmuir), Limited, in the middle of 1910.

The mines are situate in the Comox District, about sixty miles from Nanaimo. A railway about twelve miles in length connects the different mines to a shipping point at Union Bay, over which the whole coal output is conveyed.

Since this company took possession of these mines, a large outlay of capital has been invested to bring them up to a higher standard of efficiency.

This company is operating in Cumberland mines known as Nos. 4, 5, 6, and 7, situated about twelve miles from Union Bay.

A railway operating between these points is nearly all laid with 80-lb. steel rails to meet the requirements of a heavy rolling stock, consisting of 150 steel cars, each having a capacity of 50 tons.

A new piece of railway is being constructed, leaving the main line about five miles from Union Bay, at a point called Roys beach, striking along the beach around to Nos. 7 and 8 mines, thereby cutting off the heavy grade. By the construction of this branch road the company will be able to haul heavier trains, as the grade will be considerably reduced.

The company has, during the past year, made considerable progress in the installation of their hydro-electric power plant at Puntledge river, which is expected to be in operation about April 1st, 1913. All the dams are built and nearly all the machinery is on the ground, transmission-poles are erected from the power-station, and wires strung to the different mines. When completed, all the power used for operating these mines and railways will be furnished by electric power.

These mines have been operating continually up to September 16th, 1912, when, unfortunately, labour troubles arose between the company and the workmen, the miners coming out on strike on that date, and at the present time are still out.

All the mines are being operated at the present with a reduced staff of workmen, only one shift working.

The company has erected at No. 6 mine a new rescue-station, 40 x 24 feet, with smoke, dressing and work rooms, while a room for teaching "first aid" is attached. Four 2-hour Draeger rescue apparatus are on hand, with oxygen-tanks and a fully trained staff of workmen, in case of emergencies.

*See also page 260.

COMOX COLLIERY.

No. 4 MINE.

R. Henderson, Manager; C. Parham, Overman; H. Sloan, W. James, J. Dando, A. McLaughlan, W. Jones, S. Horwood, and T. Bickle, Firemen.

This mine is situated about one and one-half miles from Cumberland and about thirteen miles from the shipping point. During the present year a new Sullivan fan of the 1912 type has been installed, which started August 4th, 1912, making 180 revolutions and producing 98,000 cubic feet of air a minute, with $3\frac{1}{2}$ -inch water-gauge, driven by direct-coupled engine 18 x 18, generating 130 horse-power and giving 64 per cent. efficiency.

During the year a gob fire started in No. 11 West level, which caused all the sections west of the Main slope to be sealed off.

Owing to existing conditions in this mine, safety-lamps of the Wolf type and permitted explosives have been exclusively used.

The coal-seams are reached by two slopes, Nos. 1 and 2; a direct haulage-system being in use.

No. 1 Slope.

This slope is down a distance of 7,000 feet, running due north. A diagonal slope of 4,000 feet from the entrance of the mine, running N. 45° E., is down a distance of 2,000 feet, where levels are turned off east and west—Nos. 15, 16, 17, 18, and 19 West levels, and Nos. 16, 17, 18, and 19 East levels. Chinamen and Japanese dips are all extracting pillars; the other levels are worked on the pillar-and-stall system, all in good coal ranging from 5 to $5\frac{1}{2}$ feet in thickness, of good hard coal, with a band of rock running through the centre ranging from 10 to 12 inches in thickness, and having a fairly good clay roof.

The ventilation is produced by a reversible Sullivan fan making 180 revolutions a minute.

During my inspection in December there was 28,000 cubic feet of air a minute passing into this slope for the use of fifty men and nine mules, or a total average of 363 cubic feet of air a minute for each unit employed. Explosive gas was found in No. 33 stall, No. 15 West level; No. 4 stall, No. 18 East level; and a small gas-cap in the Japs and Chinamen pillars; all the rest of the mine was free of gas. The timbering and roadways were in good condition.

No. 2 Slope.

This slope branches off No. 1 slope a short distance from the mouth of the tunnel, running N. 45° E., and is down a distance of 8,000 feet, forming the deepest workings of the mine. The slope has been standing during the present year.

Levels are turned off east and west of this slope, namely: Nos. 15, 16, 17, 18, and 19 on the east side, and Nos. 13, 14, 15, 16, 17, and 18 on the west side. No. 15 on the east side Nos. 13, 14, 15, and 16 on the west side are extracting pillars. The other levels are in good coal ranging from $4\frac{1}{2}$ to 5 feet in thickness, with a band of rock from 12 to 15 inches in thickness. The roof is of a friable fireclay, which, coming down with the coal, makes it very dangerous for the miners and hard to keep the coal clean; 80 per cent. of the accidents in this mine are caused by this overlying strata. All the levels are worked on the pillar-and-stall system; all shots are fired by electric battery, and only Monabel powder is used.



Rescue Squad—Middlesboro Colliery—Nicola Valley.



Rescue Squad—Pacific Coast Coal Mines.

During my inspection in December I examined all parts of the above slope and found the following conditions: There was 44,000 cubic feet of air a minute passing into this slope, divided into two splits.

East Side Split.—I found 12,500 cubic feet of air a minute passing into this split for the use of forty men and seven mules, or an average of 204 cubic feet of air for each unit employed. Explosive gas was found in No. 8 stall and a little in the face of No. 18 East level; all the rest of the mine was clear of gas. The timbering and roadways were in good order.

West Side Split.—In this split I found 11,000 cubic feet of air a minute passing into this split for the use of fifty-three men and six mules, or an average of 155 cubic feet of air a minute for each unit employed. No standing gas found, but I got a gas-cap $\frac{1}{4}$ inch long in Nos. 13 and 14 pillars. The timbering and roadways are in good order.

There was 98,000 cubic feet of air a minute passing out at the fan-shaft. At No. 6 level in the main intake there was 44,000 cubic feet of air a minute passing, and at No. 17 level there was 30,000 cubic feet of air a minute passing, making the total leakage loss between these two points 14,000 cubic feet of air a minute.

No. 5 MINE.

J. H. McMillan, Manager of Nos. 5 and 6 Mines: J. Gillespie, Overman of No. 5;
D. McKinnell and J. Brown, Firemen.

This seam is reached by a shaft at a distance of 600 feet. Only the Upper seam is working at the present time, at a distance of 300 feet above the Lower seam. The Lower seam has been abandoned, allowing it to fill with water, the pump and rails having been taken out.

This seam is connected by a travelling-road with No. 6 mine, each having a separate intake and return, and being divided by double doors. This shaft acts both as an intake and return, being divided by a strong midwall between the hoisting and upcast shafts.

Nos. 1 and 2 inclines are in operation "to the rise" of the seam, and Nos. 1 and 2 slopes "to the dip" of the seam. The Main level is standing, having run up against a fault, and operations in this level have been abandoned.

This mine is worked on the pillar-and-stall system. The coal is of a very hard nature, and, owing to impurities between the coal, it is very hard to keep clean, the rock breaking up when the coal is shot down; 30-per-cent. Giant powder is being used, and the shots are fired by electric battery. The coal ranges from $3\frac{1}{4}$ to 4 feet in thickness; the No. 1 incline and dips are in solid coal.

This mine is ventilated by a Guibal fan running 120 revolutions a minute, with a water-gauge of 1 inch, producing 42,000 cubic feet of air a minute; the engine-cylinders are 14 x 18 inches.

In December, when I made my inspection, there was 30,000 cubic feet of air a minute passing, divided into two splits.

No. 1 Split.—I found 8,400 cubic feet of air a minute passing into this split for the use of twenty men and four mules, making an average of 263 cubic feet of air for each unit employed. No explosive gas was found in this mine; the timbering and roadways were in good order.

No. 2 Split.—I found 9,600 cubic feet of air a minute passing into this split for the use of forty men and eight mules, or an average of 150 cubic feet of air for each unit employed.

No. 6 MINE.

D. Walker, Overman ; J. Thompson, Fireman.

This shaft, like No. 5, is sunk to the Lower seam, about 600 feet deep, but only the Upper seam is being worked. It is worked practically the same as is No. 5 shaft, operating on both sides of the shaft. There is not much solid work going on in this shaft, only a little up the No. 1 incline and a little in the dips on the west side of the shaft ; all the rest of the workings is splitting of pillars.

This coal is like that in No. 5 shaft, of a very hard nature, with bands of rock running through the coal, making it hard to shoot and to keep clean ; 30-per-cent. Giant powder is used, and shots are fired by electric battery.

The ventilation is produced by an exhaust-fan of the Guibal type, making 106 revolutions a minute, producing 30,000 cubic feet of air a minute with 1-inch water-gauge.

The shaft is divided by a strong midwall between the hoisting and upcast portions, each being 5 x 6 feet in section.

When I made my inspection in December last, there was 24,400 cubic feet of air a minute passing into the mine, divided into two splits. No explosive gas was found in this mine, and the timbering and roadways were in good order.

No. 1 Split.—I found 12,000 cubic feet of air a minute passing into this split for the use of fourteen men and three mules, or an average of 461 cubic feet of air for each unit employed.

No. 2 Split.—There was 12,600 cubic feet of air a minute passing into this split for the use of thirty-four men and six mules, or an average of 200 cubic feet of air for each unit employed.

No. 7 MINE.

T. A. Spruston, Manager ; F. Jaynes, Overman ; H. Clifford, N. Huby, R. Bonner, and H. Davidson, Firemen.

This mine is situated about five miles from Cumberland and about seventeen miles from the shipping point at Union Bay.

During the year there have been twenty-five additional houses built, making in all 100 cottages. In addition to these, there has been built a mine manager's house, a large store, and an up-to-date hotel. The town has been called Beven. A new school-house is in the course of erection.

The mine is entered by means of two slopes running N. 35° E., and is down a distance of 5,600 feet, having been driven 621 feet during the past year ; owing to labour troubles the development-work has been retarded. At a point 2,000 feet down the Main slope, No. 3 East Diagonal slope branches off and is down a distance of 1,500 feet.

During the past year the pillar-and-stall system has been practically abandoned in favour of the long-wall system ; the coal, ranging from 2½ to 3 feet in thickness, is of a very hard nature, being well adapted to this method of working.

No. 1 Main Slope.

From this slope levels are turned off east and west—Nos. 5, 6, 7, 8, and 9 on the west side, and Nos. 5, 6, 8, and 9 on the east side. The thickness of the coal varies from 15 inches to 3 feet.

No. 3 East Diagonal.

This slope is driven off No. 3 East, at a distance of 500 feet from the Main slope, and is running north-east. Levels are only driven on the east side of this slope owing to there being a large fault on the west side. The levels are in good coal and are being worked by the long-wall method.

During the year the improvements at this mine consisted of the erection of the new tippie and the installation of two No. 3 Marcus screens, and picking-tables capable of handling 1,800 tons of coal a day.

The cars are dumped in a Phillips improved crossover dump, where the empty cars are returned by a "link-belt" car-haulage.

The ventilation is produced by a small Murphy exhaust-fan running 140 revolutions, producing 49,500 cubic feet of air a minute with a water-gauge of $1\frac{1}{2}$ inches. A new Sirocco fan to be driven by electricity, has been ordered, with a capacity of 270,000 cubic feet a minute.

When I made my inspection in December, there was 39,500 cubic feet of air passing into this mine, divided into three splits.

No. 1 Split East.—There was 18,500 cubic feet of air a minute passing into this split for the use of fifty-four men and five mules, or an average of 268 cubic feet of air a minute for each unit employed. No explosive gas was found in this split, and the timbering and roadways were in good order.

No. 1 Split West.—There was 4,400 cubic feet of air a minute passing into this split for the use of twelve men and one mule, or an average of 293 cubic feet of air a minute for each unit employed. No explosive gas was found, and the timbering and roadways were in good order.

No. 2 Split West.—There was 15,000 cubic feet of air a minute passing into this split for the use of forty men and three mules, or an average of 288 cubic feet of air a minute for each unit employed. A little explosive gas found in the No. 1 slant and in No. 8 level; all the rest of the split was clear. The timbering and roadways were in good order.

No. 8 MINE.

T. A. Spruston, Manager.

This mine is situated about one and one-half miles east of No. 7 mine and about four and one-half miles from the town of Cumberland. This company has erected a sawmill with a capacity of 20,000 feet of lumber a day.

Two shafts are being sunk. The main shaft is 11 x 22 and the air-shaft 11 x 18. The main shaft is down a distance of 300 feet.

The plant consists of a Sullivan air-compressor with a capacity of 1,200 cubic feet free air, two return-tube boilers of 107 horse-power, and two hoisting-engines.

Twenty-five houses are nearing completion, and the railway-sidings are being excavated by a steam-shovel. In all, large sums of money are being spent to make this mine an up-to-date concern.

The following are the official returns from the Comox Colliery for the year 1912 :—

SALES AND OUTPUT FOR YEAR.	COAL.		COKE.	
	Tons.	Tons.	Tons.	Tons.
(Tons of 2,240 lb.)				
Sold for consumption in Canada	269,020		4,266	
" export to United States	57,677			
" " other countries	15,311			
Total sales		342,008		4,266
Lost in washing	114,246			
" under colliery boilers, etc.	40,256			
Total for colliery use		154,502		
		496,510		
Stocks on hand first of year	23,488		6,636	
" last of year	2,781		2,370	
Difference taken from stock during year		20,707		4,266
Output of colliery for year		475,803		<i>Nil.</i>

By-products—Fireclay, 3,819 tons.

NUMBER OF HANDS EMPLOYED, DAILY WAGES PAID, ETC.

CHARACTER OF LABOUR.	UNDERGROUND.		ABOVE GROUND.		TOTALS.	
	No. employed.	Average Daily Wage.	No. employed.	Average Daily Wage.	No. employed.	Average Daily Wage.
Supervision and clerical assistance	42	\$ 3.57 - 9.00	7	\$ 4.00 - 6.00	49	
Whites—Miners	280	3.30 - 5.50			280	
Miners' helpers	10	3.00			10	
Labourers	60	2.47 - 3.30	38	2.47 - 3.02	98	
Mechanics and skilled labour	38	3.30 - 3.85	40	3.30 - 3.85	78	
Boys	21	1.37 - 2.47	12	1.10 - 1.65	33	
Japanese miners	55	3.50			55	
" labourers	46	1.75	12	1.40 - 1.65	58	
Chinese miners	85	3.50			85	
" labourers	129	1.75	108	1.40 - 1.65	237	
Totals	766		217		983	

Pacific Coast Coal Mines, Limited.*

SQUASH COLLIERY.

James Renny, Overman; John Jenkins, Fireboss.

This colliery is owned by the Pacific Coast Coal Mines, Limited, and is situated on the northern part of east coast of Vancouver Island.

A shaft 6 x 10 feet in the clear is down 170 feet, with a midwall between the hoisting and the upcast compartments. Two levels are turned off from the shaft-bottom, N. 45° W.

* See also page 263.

and S. 45° E. respectively. The North-west level has not been advanced during the year; the South-east level is in quite a distance, and long-wall work exclusively has been opened out in this level. The coal ranges from 4 to 6 feet in thickness, with small bands of rock running through the coal; this seam is well adapted for the long-wall work, and mine should make an ideal one for this system. Two slopes are turned off 500 feet from the shaft-bottom on this level, running N. 45° E., and are down 1,700 feet, but have not been worked during this past year. All the work done was in opening out the South-east level on to long-wall system. The coal is of excellent quality and is in great demand.

On my inspection, I found the mine in very good order, well timbered and cogged, and with a very good roof. For the use of ten men and one horse, there was 13,000 cubic feet of air a minute going through the mine and around the long-wall workings, the ventilation being produced by a Sheldon fan, 4 x 2½ feet in size, making 125 revolutions a minute, with a water-gauge of 1¼ inches.

The following are the official returns from the Suquash Colliery for the year 1912:—

SALES AND OUTPUT FOR YEAR. (Tons of 2,240 lb.)	COAL.		COKE.	
	Tons.	Tons.	Tons.	Tons.
Sold for consumption in Canada	3,026			
" export to United States				
" " to other countries				
Total sales		3,026		
Used in making coke				
" under colliery boilers, etc.	685			
Total for colliery use		685		
		3,711		
Stocks on hand first of year				
" last of year	781			
Difference added to stock during year				
		781		
Output of colliery for year		4,492		

NUMBER OF HANDS EMPLOYED, DAILY WAGES PAID, ETC.

CHARACTER OF LABOUR.	UNDERGROUND.		ABOVE GROUND.		TOTALS.	
	No. employed.	Average Daily Wage.	No. employed.	Average Daily Wage.	No. employed.	Average Daily Wage.
Supervision and clerical assistance.....	1	\$	1	\$	2	\$
Whites—Miners	10	4.00			10	4.00
Miners' helpers.....						
Labourers	2	3.00	3	3.00	5	3.00
Mechanics and skilled labourers			2	3.50	2	3.50
Boys						
Japanese						
Chinese						
Indians						
Total.....	13		6		19	

Name of seams or pits—Suquash No. 1 mine (upper seam).

Description of seams, tunnels, levels, shafts, etc., and number of same—One shaft 6 x 10 feet, with midwall one side for hoisting and one side for ventilation. From the shaft-bottom two levels are driven south-east for a distance of about 1,200 feet. Two slopes are driven down a distance of about 1,200 feet north-east. Seam is from 5 to 6 feet in thickness and of good quality, being practically smokeless and giving off great heat.

Description and length of tramway, plant, etc.—One donkey-engine with vertical boiler attached (for hoisting); one small fan for ventilation, producing about 14,000 cubic feet a minute; one duplex pump, capacity 50 gallons a minute, for pumping water from mine; a small pit-head and screening arrangements capable of handling 200 tons daily. A narrow-gauge tramway runs from pit-head to wharf, a distance of about 400 feet. The loading arrangements are suitable for loading scows and small craft. Underground there is about one mile of narrow-gauge track and sixteen mine-cars.

British Pacific Coal Co., Ltd.

The British Pacific Coal Company, Limited, has, for the past couple of years, been developing coal-seams on the south end of Graham island, one of the Queen Charlotte group. These seams are near Skidegate channel, on which the shipping wharf has been built. Considerable development-work has been done and a few tons of coal sold but the property has scarcely as yet entered the list of actual producers.

The following are the official returns of the property for the year 1912 :—

SALES AND OUTPUT FOR YEAR.	COAL.		COKE.	
	Tons.	Tons.	Tons.	Tons.
(Tons of 2,240 lb.)				
Sold for consumption in Canada				
" export to United States				
" " other countries				
Total sales				
Used in making coke				
Used under colliery boilers, etc	32			
Total for colliery use		32		
Stocks on hand first of year				
" last of year				
Difference added to stock during year				
Output of colliery for year		32		

NUMBER OF HANDS EMPLOYED, DAILY WAGES PAID, ETC.

CHARACTER OF LABOUR.	UNDERGROUND.		ABOVE GROUND.		TOTALS.	
	No. employed.	Average Daily Wage.	No. employed.	Average Daily Wage.	No. employed.	Average Daily Wage.
Supervision and clerical assistance	1	\$ 4.00	.....	\$ .....	1	.....
Whites—Miners	6	4.00	.....	.....	6	.....
Miners' helpers	3	3.75	15	3.50	18	.....
Labourers .....	.....	.....	.....	.....	.....	.....
Mechanics and skilled labour .....	.....	.....	.....	.....	.....	.....
Boys .....	.....	.....	.....	.....	.....	.....
Japanese .....	.....	.....	.....	.....	.....	.....
Chinese .....	.....	.....	.....	.....	.....	.....
Indians .....	.....	.....	.....	.....	.....	.....
Totals	10	.....	15	.....	25	.....

Name of seams or pits—Coal Creek tunnel.

Description of seams, tunnels, levels, shafts, etc., and number of same—Seam A, 5 feet 9 inches, graphite; seam B, 5 feet 10 inches, 4 feet 4 inches coal; seam C, 5 feet 4 inches, 4 feet coal; seam D, 5 feet 4 inches, 4 feet coal; seam E, 5 feet, 2 feet coal; tunnel, 757 feet.

Description and length of tramway, plant, etc.—Tramway, one and three-quarter miles long, operated by logging-engine; wharf (with approach), 600 feet long; powder-magazine near sea-beach. Buildings in camp, bunk, wash, cook, and foreman's house, and stable; buildings at mine, blacksmith-shop and powder-house; at portal, one 5-horse-power Pelton water-wheel, with small fan for ventilation purposes.

NICOLA-PRINCETON INSPECTION DISTRICT.

REPORT OF ROBERT STRACHAN, INSPECTOR.

I have the honour to submit my annual report as Inspector of Coal-mines for the Nicola-Princeton Inspection District for the year 1912.

The Nicola-Princeton District, which was created a separate Inspection Division of the Coast District in the latter end of May, 1912, comprises the mines of the Nicola Valley Coal and Coke Company, Limited, Middlesboro; Inland Coal and Coke Company, Merritt; Diamond Vale Colliery Company, Limited, Merritt; Pacific Coast Colliery Company, Merritt, in the Nicola District; Columbia Coal and Coke Company's Mount Carbon Colliery, Coalmont; Princeton Coal and Land Company, Limited, Princeton; United Empire Mining Company, Princeton, in the Princeton District.

The accidents previous to June 1st, when I was transferred here, were reported to Inspector Morgan, since when I have only seven to report, none of which are fatal; of these, four were due to haulage and three to "falls of top coal." A list of these accidents is attached.

Since June there have been two prosecutions, one for a shotfirer charged with shooting off the solid, the case being dismissed; one for a miner smashing his safety-lamp, contrary to Special Rule 79—the accused fled the country; and in one case the Hon. the Minister of Mines directed an inquiry to be held as to the competency of a miner who had faked tamping cartridges, using coal-dust in the centre, with clay at each end.

Nicola Valley Coal & Coke Co., Ltd.

Head Office—Vancouver, B.C.

Capital, \$1,107,700.

<i>Officers.</i>	<i>Address.</i>
John Hendry, President,	Vancouver, B.C.
Alexander McLaren, Vice-President,	Vancouver, B.C.
W. H. Armstrong, Managing Director and General Manager,	Vancouver, B.C.
J. J. Plommer, Secretary-Treasurer,	Vancouver, B.C.
Charles Graham, Mine Manager,	Vancouver, B.C.

Value of plant, \$170,000.

MIDDLESBORO COLLIERY.

Charles Graham, Manager.

The above colliery is situated about one mile from Merritt, and at present only Nos. 2 and 4 mines are being operated.

No. 2 MINE.

Robert Fairfoull, Overman.

This mine, which is situated in the Coldwater hill, is operated by a slope driven on the coal-seam; the coal is 5½ feet thick, dipping at about 20 degrees to the west; the pillar-and-stall method of mining is used, the stalls being about 30 feet, leaving a pillar of 20 x 30 feet. The coal is all mined by hand. Monabel powder being used for blasting, fired by an electric detonator and battery. In the interior of the mine the coal-cars are hauled by compressed-air hoists to the main landings, from where it is lifted by a tail-rope to the head of the slope; a 15 x 18-inch steam-hoist works the tail-rope.

At the No. 2 mine there is one return-tubular boiler (Goldie-McCulloch) of 150 horse-power capacity for providing steam for the hoist, and a 14- x 18-inch Canadian Rand compressor, having a direct steam end, compounded on the air end; this provides the compressed air to operate the inside hoists and pumps.

The coal from this mine is hauled by a steam-locomotive to the No. 1 tibble. Ventilation is provided for by a 56- x 36-inch belt-connected Sheldon fan, driven by a 15- x 14-inch steam engine; engine-speed, 166 revolutions a minute; fan-speed, 309 revolutions a minute.

I have inspected this mine every month and have always found conditions very good, both in respect to timber, roads, and ventilation.

In the No. 2 split (lower workings) I found a very faint cap of gas with the Cadman-Cunninghame gas-detector, fitted into a Cranter-Wolf safety-lamp; this part of the mine is worked by safety-lamps exclusively.

The No. 1 split is worked by open lights, and I have never found any trace of gas; the division between the safety-light and open-light district is well marked with danger-boards and safety-lights showing a red or danger colour. There was, at my last inspection, 26,000 cubic feet of air a minute provided for the use of eighty men and five horses, allowing 273 cubic feet of air a minute for every unit in the mine (a horse equals 3 units).

Since taking charge of this district I have not had a single accident to report.

No. 4 MINE.

David Brown, Overman.

This mine is reached by a crosscut tunnel from the main level of the No. 5 mine, which has been abandoned, and has generally been considered as in the top seam of the Coal Gully series, but during the past summer a tunnel has been driven from the top of the No. 4 slope which has uncovered another seam situated about 150 feet higher up. The coal is about 10 feet thick, dipping at an inclination of 25 degrees to the south. The method of work is pillar and stall, the stalls being 12 feet wide and the pillars 60 x 30 feet.

As mentioned above, another seam has been discovered by a crosscut tunnel 400 feet long driven level from the top of the No. 4 slope; this new seam is termed the No. 6, and is 5 feet thick, dipping at same rate and direction as the No. 4 seam. The present intentions are to open this up on the long-wall system, and, although in the initial stages, all work at present being done is in this direction.

Haulage in the No. 4 seam is by hand to the slope, hoisting up the slope by a 12- x 15-inch air-hoist; horses take the cars from top of slope to the tippie.

Ventilation is provided by a Sheldon fan $8\frac{1}{2}$ feet diameter, having a capacity of 100,000 cubic feet a minute, with a 4-inch water-gauge; at present the quantity of air circulating is 60,000 cubic feet a minute for the use of sixty-two men and five horses, allowing 778 cubic feet of air a minute for each unit in the mine; water-gauge, 4 inches. Speed of fan-engine, 184 revolutions a minute; speed of fan, 220 revolutions a minute.

I have examined this mine every month and have generally found conditions fairly good; at my last inspection I found a small quantity of explosive gas in an abandoned place, which was, however, fenced off, all the other places being clear and fairly well ventilated. The roads and working-places were all well timbered and in good condition; Wolf safety-lamps are exclusively used in this mine. Blasting is done with Monabel powder fired by electric detonator with battery.

All the safety-lamps used in the mines (both Nos. 2 and 4) are cleaned and tested as provided for by section 91, Rule 10, "Coal-mines Regulation Act," at the lamp-room near the tippie, and again examined by the fireboss previous to being allowed to enter the mine.

As required by Rule 4, the firebosses are equipped with Cramer-Wolf safety-lamps fitted with the Cadman-Cunninghame gas-detector, so as to enable them to detect smaller percentages of gas than can be detected with the ordinary safety-lamp.

The tippie, which is of wooden construction, handles the coal from both mines; the cars, which have a capacity of 1.5 tons, have a door at one end, and are built at the mine, of 2-inch plank with iron fittings. The cars are dumped by a Phillips crossover dump, the coal passing to a shaking screen which allows all slack under $2\frac{1}{2}$ inches to pass into a hopper; the round or lump coal being taken over a picking-table, 42 feet long, where the refuse is picked out by hand, the coal being then conveyed by a scraper conveyor to the lump-coal bin. The screenings or slack coal is fed to a Stewart washer erected by the Roberts & Schaefer Company, Chicago, capable of treating 100 tons an hour. Three grades of coal are made—namely, "lump," "pea," and "slack." The scraper conveyor is so arranged that the coal from the picking-table and washer can be put either directly into the bin, of 350 tons capacity, or carried direct to the loading chute. A portable Christy box-car loader is used to load box cars.

The plant at the No. 4 mine consists of four 150-horse-power return-tubular boilers; one Canadian Rand cross-compound air-compressor, capacity 2,000 cubic feet free air a minute; and one $27\frac{1}{2}$ -kw. generator for electric-lighting purposes.

A rescue training-station is also maintained, fitted with four 2-hour Draegers, two $\frac{1}{2}$ -hour Draegers, recharging-pump, pulmotor, water-gauge for testing feed, and an ample supply of regenerators and oxygen.

All the certificated officials have either taken a course in rescue-work or are doing so at present, as are also many of the miners.

During the past year twelve certificates were granted to those who had taken a satisfactory course, and the granting of these certificates is giving great encouragement to others to qualify.

NOTE BY MANAGEMENT.

During the past year the output has been decreased by about 50,000 tons, due principally to the shutting-off of No. 1 mine on March 22nd, owing to fires having broken out in this mine. The principal operations during the year were in Nos. 2 and 4 mines. During the year a new seam (No. 6) about 5 feet thick was discovered, and a tunnel driven in 400 feet to open up this seam. This was completed late in December, and is a continuation of the tunnel driven from old No. 5 to No. 4. No new equipment or improvements of any other kind have been made during the past year.

The following are the official returns from the Middlesboro Colliery for the year 1912:—

SALES AND OUTPUT FOR YEAR. (Tons of 2,240 lb.)	COAL.		COKE.	
	Tons.	Tons.	Tons.	Tons.
Sold for consumption in Canada	134,803			
" export to United States				
" " to other countries				
Total sales		134,803		
Used in making coke				
" under colliery boilers, etc.	8,354			
Total for colliery use		8,354		
Stocks on hand first of year	615	143,157		
" last of year	431			
Difference taken from stock during year		184		
Output of colliery for year		142,973		

NUMBER OF HANDS EMPLOYED, DAILY WAGES PAID, ETC.

CHARACTER OF LABOUR.	UNDERGROUND.		ABOVE GROUND.		TOTALS.	
	No. employed.	Average Daily Wage.	No. employed.	Average Daily Wage.	No. employed.	Average Daily Wage.
Supervision and clerical assistance	22	\$ 3.50 - 4.00	7	\$	29	
Whites—Miners	140	3.30 - 5.50			140	
Miners' helpers						
Labourers	75	2.75 - 3.30	40	2.75 - 3.00	115	
Mechanics and skilled labour			20	3.30 - 4.25	20	
Boys			6	1.25 - 2.00	6	
Japanese						
Chinese						
Indians						
Totals	237		73		310	

Inland Coal & Coke Company, Ltd.

(FORMERLY THE COAL HILL SYNDICATE.)

Head Office—Merritt, B.C.

<i>Officers.</i>	<i>Address.</i>
Geo. I. Wilson, President,	Vancouver, B.C.
W. L. Nichol, Vice-President,	1200 Comox Street, Vancouver, B.C.
K. C. Smith, Secretary-Treasurer,	Pacific Block, Vancouver, B.C.
Joseph Graham, Vice-Pres. and Gen. Man.,	Merritt, B.C.
Andrew Bryden, Mine Manager,	Merritt, B.C.

Value of plant, \$3,000.

Andrew Bryden, Manager ; Geo. Hudson, Overman.

This company's property is situated west, and about 500 feet higher up the hill than the Nicola Valley Coal and Coke Company's mines ; five seams have been opened, varying from 8 to 16 feet thick.

During the past year all the work has been confined to the No. 3 seam ; this seam is 10 feet thick, and at an inclination of 35 degrees. The method of work is pillar and stall ; the pillars are 48 x 100 feet, stalls 15 feet. The coal is taken from the face by chutes, loaded into cars holding 1 ton, and then delivered to the hoist. The main slope is now down about 600 feet, with five levels to the right-hand side and four to the left. This seam has a strong sandstone roof and floor, very little timber being used, although lately there has been a tendency to use more, with a view to the prevention of falls from unseen slips.

During my inspection I have generally found this mine in good condition ; I have never found any trace of gas, and there is sufficient water to keep the roadways damp. At my last inspection I found 18,000 cubic feet of air a minute for the use of eighteen men. The speed of the fan was 180 revolutions a minute. Open lights are used in this mine, the inspections being made with safety-lamps of the Wolf type. Blasting is done with a 40-per-cent. Giant and fuse. Copies of the Mines Act, special rules, and a plan of the mine are all posted at the entrance to the mine.

The plant consists of two 50-horse-power boilers of the Leonard type, one of which is at present used for steam purposes ; the hoisting-engine is an 8- x 10-inch double-drum Beatty engine, one drum of which is used for hoisting up the mine slope, the other for lowering the loads to the top of the gravity-plane and hauling the empties back.

Ventilation is produced by a single-entry fan of the Sheldon type, capable of producing 50,000 cubic feet a minute. The fan is driven by belt from a 12- x 16-inch steam-engine, ratio of fan to engine being $4\frac{1}{2}$ to 4 ; an alternating dynamo has also been installed for lighting purposes.

The gravity-plane is a three-rail track 1,760 feet long, with a passing at the half-way ; the coal is delivered to a tippie, 400 feet long, with bunker capacity of 400 tons. The coal is picked in a primitive fashion before being delivered into the bunkers, from which it is drawn as required to load the cars. The tippie is connected to the Canadian Pacific Railway by a standard-gauge track one mile long, on which is a pair of Fairbanks railroad scales for weighing cars.

During the past summer it was found necessary to install a plant to pump water to the mine for steam and other purposes; a 5- x 3½-inch pump at the Coldwater river pumps to a water-tank, capacity 30,000 gallons, situated near the tipple, where another pump then delivers the water to the mine.

Rescue apparatus to the extent of two ½-hour Draeger apparatus, with supplies of oxygen and regenerators, have been provided, and in the near future we expect all the officials, and many of the miners, will be sufficiently trained to be able to use these efficiently, should the necessity arise.

The following are the official returns of the Inland Colliery for the year 1912:—

SALES AND OUTPUT FOR YEAR. (Tons of 2,240 lb.)	COAL.		COKE.	
	Tons.	Tons.	Tons.	Tons.
Sold for consumption in Canada	30,000			
" export to United States				
" " other countries				
Total sales		30,000		
Used in making coke	1,200			
" under colliery boilers, etc.				
Total for colliery use		1,200		
		31,200		
Stocks on hand first of year				
" last of year	100			
Difference added to stock during year		100		
Output of colliery for year		31,300		

NUMBER OF HANDS EMPLOYED, DAILY WAGES PAID, ETC.

CHARACTER OF LABOUR.	UNDERGROUND.		ABOVE GROUND.		Totals.	
	No. employed.	Average Daily Wage.	No. employed.	Average Daily Wage.	No. employed.	Average Daily Wage.
Supervision and clerical assistance	4	\$ 4.00	3	\$ 4.50	7	4.40
Whites—Miners	20	3.50			20	3.50
Miners' helpers	5	3.00			5	3.00
Labourers	2	3.00	8	3.00	10	3.00
Mechanics and skilled labour	1	4.00	3	4.00	4	4.00
Boys						
Japanese						
Chinese						
Indians						
Totals	32	3.75	14	3.60	46	3.80

Name of seams or pits—Nos. 1, 2, 3, 4, and 5.

Description of seams, tunnels, levels, shafts, etc., and number of same—The Nos. 1 and 2 seams were not worked during the year. The No. 1 is 2 feet 6 inches thick with a clay roof, and the No. 2 is 8 feet thick with a slate roof. The original prospect-shaft cut the

No. 1 at 30 feet and the No. 2 at 100 feet depth. A slope has been driven on the No. 1 300 feet and the No. 2 500 feet. The work done and the coal won during the past year has been from the No. 3 seam exclusively; the slope, which has an average pitch of 35 per cent., has been deepened; and all the levels down to the No. 6 have been extended. Both the roof and floor are sandstone and the seams average $10\frac{1}{2}$ feet thick of coal. There is very little water, and is not sufficient for the boiler plant. No explosive gas has ever been found in any of the workings. No. 4 seam is 16 feet thick, but no work has been done on it; No. 5 is 9 feet thick, and no work has been done on it, but it is the intention to open it up this year, as it lies between Nos. 2 and 3 seams.

Description and length of tramway, plant, etc.—The hoist is a 25-horse-power Beatty double-drum type; two 50-horse-power boilers, Leonard type, one of them only in use, furnish steam. The fan was supplied by the Robert Hamilton Company, and has a capacity of 55,000 cubic feet. The coal from the mouth of the slope is let down 1,500 feet on a 3-per-cent. grade to head of the gravity-tram, which is 2,000 feet long, with an average grade of 25 per cent., and handles 10- or 12-ton loads quite easily, connecting at the foot of the hill with the trestle which leads to the bunkers, which have a capacity of 400 tons, horses doing the hauling on the trestle. The coal is remarkably free from rock and dirt, but is cleaned by hand before going into the bunkers. A Fairbanks railroad scale is at the bunkers, and after being weighed the cars are run over the company's railroad, one mile long, to the C.P.R. tracks near Merritt for shipment. An electric-lighting plant has been installed of fair size. A water system from the Coldwater river was laid during the year to the mine, a distance of one and a half miles.

Diamond Vale Collieries, Limited.

Head Office—Vancouver, B.C.

Capital, \$750,000.

<i>Officers.</i>	<i>Address.</i>
T. J. Smith, President,	Pacific Building, Vancouver, B.C.
F. J. Lumsden, Vice-President,	Vancouver, B.C.
J. A. McInnes, Secretary-Treasurer,	Vancouver, B.C.
A. E. Smith, Mine Manager,	Merritt, B.C.

Value of plant, \$50,000.

DIAMOND VALE COLLIERY.

A. E. Smith, Manager; A. Horrocks, Overman.

This company's property lies immediately to the south of the Middlesboro Colliery, the Coldwater river being the boundary between them. The two shafts mentioned in the previous reports are not being continued, and the machinery has been removed.

No. 3 MINE.

During the past year only the slope (No. 3) has been in operation, and since the explosion in March last there has been very little work done in it, until November, when it was reopened for repair and to be put in shape for producing. The No. 3 slope has been sunk on the seam

for a distance of 650 feet; one level (No. 3) has been opened for a distance of 800 feet on the east side, and No. 4 on the west side for 550 feet. The dip is about 35 degrees, and seven double-stalls have been driven on the east side and three double-stalls on the west side. In the working of these double-stalls the custom has been to connect them, about 25 feet up, so as to form a counter-gangway, then drive the stall 36 feet wide up the pitch, the refuse being packed in the centre to support the roof and to provide the means to conduct the ventilation to the face. The pillars were generally 36 feet thick.

Since reopening, the fan has been removed so as to comply with the "Coal-mines Regulation Act"; safety-lamps of the Wolf type have replaced the open lights formerly used, and apparatus for testing the lamps installed, while the firebosses have been equipped with Cramer-Wolf safety-lamps fitted with the Cadman-Cunninghame gas-detector; crosscuts have been driven to effect communication between the various stalls and provide a return airway; sanitary provision has been provided; special rules have been adopted; an ambulance box acquired, while rescue apparatus of the Draeger type is expected at an early date.

The power plant consists of one 30-horse-power and one 10-horse-power boiler; an 8- x 12-inch hoist for hauling coal up the slope; a pump for pumping water from the river to boilers; the fan-engine, 8 x 8 inches, drives a 2½-foot fan direct.

New offices, a workshop, and engine-room have been built, and early in the new year a larger fan will be installed to cope with the increasing development of the mine.

At my inspection in December I found no trace of gas; there was a good current of air circulating at the faces, and I found 6,270 cubic feet a minute for the use of 12 men; the roads and timbering were in good condition, and so far as I could observe, the Mines Act was being complied with. Copies of the Act, special rules, and a plan of the mine were posted at the entrance to the slope. The only blasting permitted in this mine is in rock-work, where 30-per-cent. Giant is used.

The following are the official returns from the Diamond Vale Colliery for the year 1912:—

SALES AND OUTPUT FOR YEAR.	COAL.		COKE.	
	Tons.	Tons.	Tons.	Tons.
(Tons of 2,240 lb.)				
Sold for consumption in Canada	3,130			
" export to United States				
" " to other countries				
Total sales		3,130		
Used in making coke				
" under colliery boilers, etc.	180			
Total for colliery use		180		
		3,310		
Stocks on hand first of year				
" last of year				
Difference { added to } stock during year				
Output of colliery for year		3,310		

NUMBER OF HANDS EMPLOYED, DAILY WAGES PAID, ETC.

CHARACTER OF LABOUR.	UNDERGROUND.		ABOVE GROUND.		TOTALS.	
	No. employed.	Average Daily Wage.	No. employed.	Average Daily Wage.	No. employed.	Average Daily Wage.
Supervision and clerical assistance	3	\$ 4.00	2	\$ 4.50	5	\$ 4.25
Whites—Miners.....	18	3.50	.....	.....	18	3.50
Miners' helpers.....	.....	.....	.....	.....	.....	.....
Labourers	9	3.25	7	3.00	16	3.12
Mechanics and skilled labour .....	.....	.....	5	3.50	5	3.50
Boys .....	.....	.....	.....	.....	.....	.....
Japanese .....	.....	.....	.....	.....	.....	.....
Chinese.....	.....	.....	.....	.....	.....	.....
Indians .....	.....	.....	.....	.....	.....	.....
Totals	30	3.58	14	3.67	44	3.79

Name of seams or pits—No. 3 slope, Diamond Vale Colliery.

Description of seams, tunnels, levels, shafts, etc., and number of same—The seam of coal in this mine is $4\frac{1}{2}$ feet thick, with two bands of rock in it, each band 6 inches thick. It pitches at an angle of 45 degrees.

Description and length of tramway, plant, etc.—The plant consists of one locomotive-type boiler, 30 horse-power, and two vertical boilers, a small hoist, and an exhaust-fan $2\frac{1}{2}$ feet in diameter. The slope is down 650 feet; there are two levels turned off to the east, No. 1 East level being in 400 feet and No. 2 East 850 feet. There is also one level to the west which is in 550 feet.

Pacific Coast Colliery Co. of B.C.

Head Office—Minneapolis, Minn.

Capital, \$500,000.

Officers.

Jas. C. Andrews, President, 215 N.Y. Life Building,	Minneapolis, Minn.
G. B. Norris, Vice-President,	Minneapolis, Minn.
G. H. Derry, Secretary,	Minneapolis, Minn.
J. S. Sherril, Treasurer,	Minneapolis, Minn.
W. E. Duncan, Consulting Engineer,	Merritt, B.C.

Address.

Howell John, Overman.

The Pacific Coast Colliery Company's property is situated north and adjoining the Nicola Valley Coal and Coke Company's mines. During the present year very little work has been done on this property, and in the month of August all underground work was stopped, and I understand arrangements have been made to test the field by diamond-drill.

The No. 2 slope, which has been driven 300 feet, is 7 x 8 feet, and has not been operated during the present year. No. 2 shaft, which is sunk to reach the coal-seam at 147 feet, has a slope driven from the bottom for a distance of 700 feet, with several short levels on either side.

During my inspections of this mine I found general conditions fair, but the ventilation poor, the fan provided being inadequate for the purpose. The equipment is small, consisting of two 10-horse-power boilers of the tubular type; the hoist for the shaft is a 7- x 10-inch reversible-motion hoist; the hoist for the No. 2 shaft slope is a 6- x 8-inch double-cylinder hoist.

The following are the official returns for the Pacific Coast Colliery for the year ending 1912:—

The company has been engaged in developing its property and no output of coal was made.

NUMBER OF HANDS EMPLOYED, DAILY WAGES PAID, ETC.

CHARACTER OF LABOUR.	UNDERGROUND.		ABOVE GROUND.		TOTALS.	
	No. employed.	Average Daily Wage.	No. employed.	Average Daily Wage.	No. employed.	Average Daily Wage.
Supervision and clerical assistance	1	\$ 5.00	2	\$ 5.00	3	\$ 5.00
Whites—Miners	4	4.00	.....	.....	4	4.00
Miners' helpers .....	.....	.....	.....	.....	.....	.....
Labourers	1	3.00	1	3.00	2	3.00
Mechanics and skilled labour .....	.....	.....	1	3.50	1	3.50
Boys .....	.....	.....	.....	.....	.....	.....
Japanese .....	.....	.....	.....	.....	.....	.....
Chinese .....	.....	.....	.....	.....	.....	.....
Indians .....	.....	.....	.....	.....	.....	.....
Totals	6	\$12.00	4	\$11.50	10	\$15.50

Name of seams or pits—No. 1 slope, No. 2 shaft.

Description of seams, tunnels, levels, shafts, etc., and number of same—No. 1 slope is driven from the surface to a distance of 300 feet at an angle of 30 degrees. The size of this slope is 7 x 9 feet, and has not been worked during the past year. No. 2 shaft is down 147 feet, 12 feet of which is used as a sump. A level, 7 x 8 feet, is driven for 90 feet from the bottom of the shaft, from whence a slope is driven for 610 feet with the dip of the seam, which dips at an angle about 20 degrees. The thickness of this seam in the shaft is 18 feet, with a few bands of rock in between. There are four levels turned to the left off the main entry and two levels to the right. This mine is ventilated by means of natural ventilation.

Description and length of tramway, plant, etc.—There are two 10-horse-power vertical tubular boilers, at No. 2 shaft, also two hoisting-engines; one 6 x 8 double-cylinder single-friction drum hoisting-engine, which is used for hoisting the cars from the slope in No. 2 shaft. For hoisting out of the shaft we have an engine size 7 x 10, reversible-link motion, fitted with a throwing-out clutch, also a depth indicator.



Bureau of Mines

Princeton Colliery—Headworks and Tipple.



B.C. Bureau of Mines

Mt. Carbon Colliery—Columbia Coal & Coke Co.

Princeton Coal and Land Company, Ltd.

Head Office—15 Great St. Helens, London, E.C.

Capital, £200,000.

<i>Officers.</i>	<i>Address.</i>
A. St. George Hamersley, Chairman,	London, Eng.
Sheffield Neave, Director,	London, Eng.
Alex. Crerar, Director,	London, Eng.
Arthur Hicklin, Advisory Director,	London, Eng.
Oswald J. Bambridge, Director,	London, Eng.
E. S. Neave, Secretary,	London, Eng.
Ernest Waterman, General Manager,	Princeton, B.C.
Jas. Holden, Mine Manager,	Princeton, B.C.

Value of plant, \$77,000.

This company began operations in December, 1909, and was formerly the Vermilion Forks Mining and Development Company.

James Holden, Manager ; Andrew McKendrick, Overman.

This company's property is situated at the junction of the Tulameen and the Similkameen rivers, at the town of Princeton, in the Similkameen Mining Division. The mine, which is situated on the bench above the Similkameen river, consists of a slope, which has been driven down on the seam for a distance of 1,100 feet. On the west side three levels have been driven, while four have been driven on the east side. The seam is 24 feet thick, intersected with bands of clay ; only the upper 9 feet of the seam is worked at present.

The following is a section of the seam :—

24" coal	}	Portion that is worked.
12" "		
24" "		
6" clay		
6" coal		
48" "		
6" "		
9" fireclay.		
12" coal.		
12" soapstone.		
16" coal.		
24" "		
10" clay and bone.		
24" coal.		
18" "		
6" "		
24" "		
24' 0"		

Most of the bands are clay and vary from $\frac{1}{8}$ inch to $\frac{3}{4}$ inch in thickness. The coal is of lignitic nature and is worked by pillar-and-stall method ; coal is mined and sheared by post coal-cutting machines, of either the Hardy or Rand type ; by this means the coal is blasted down with the minimum of explosive and giving the maximum of round or lump coal. Monabel is used for blasting, with fuse.

Ventilation is produced by a 6- x 30-foot fan, Guibal type, driven by a 25-horse-power engine, belt-drive gear 2 to 1. The mine, which is very free from gas, is well ventilated, the above fan producing 36,000 cubic feet of air a minute for the use of sixty men and three horses, allowing an average of 521 cubic feet a minute for each unit in the mine. Speed of fan, 136 revolutions a minute ; water-gauge, $\frac{1}{4}$ inch.

I have always found the roads and places well timbered and in good condition; copies of the Act, special rules, a plan of the mine posted at the entrance to the mine, and, generally, the Mines Act is strictly adhered to. Open lights are used in this mine, the inspection being made with safety-lamps of the Wolf type.

The mine-cars have a capacity of 1.5 tons, and are hauled up to the tippie in trips of six by a 50-horse-power Jenks hoist. The tippie, which is situated 44 feet above the level of the ground, is built of timber; here the coal is dumped and screened into three sizes; all over 4 inches is termed "lump," from 2 to 4 inches is termed "egg," and $\frac{5}{8}$ to 2 inches is termed "nut"; the various sizes of coal are then taken by belt-conveyor to the bunker, where each size is kept separate; the bunker has a capacity of 240 tons. In drawing the coal from the bunker a conveyor is used to take the coal to the box-car loader; therefore any kind of coal can be loaded as required.

The boiler plant consists of two 275-horse-power Goldie-McCulloch boilers and one 50-horse-power Gray boiler, the feed-water being heated by the exhaust from the compressor.

The power plant consists of one Rand compressor of a capacity of 744 cubic feet free air a minute, and one 6-kw. direct-current generator for lighting purposes. One 35-horse-power and one 25-horse-power engines, both of the Link Belt Company's make, are used for driving the picking-table belts. The box-car loader is of the Victor type. The machine-shop is equipped with a McDougal lathe, a 350-lb. steam-hammer, drill-press, a 2-inch Acme bolt-cutter, a Merrill pipe-machine, a 20-inch shaper, a hack-saw, and emery-grinder. A 12-x 7-x 12-inch pump is used for fire-protection purposes, pumping into a water-tank with a capacity of 30,000 gallons, giving a pressure of 200 lb. to the square inch.

The above forms a very efficient plant for handling the coal, up to a capacity of about 600 tons a day.

Rescue apparatus of the Draeger type has been acquired; one 2-hour type, one $\frac{1}{2}$ -hour type, one pulmator for resuscitation, with an inhalation device attached, pump, water-gauge, and a sufficient supply of oxygen and regenerators are kept on hand; most of the officials have or are taking lessons, so as to enable them to use the apparatus efficiently.

The following are the official returns from the Princeton Colliery for the year 1912:—

SALES AND OUTPUT FOR YEAR.	COAL.		COKE.	
	Tons.	Tons.	Tons.	Tons.
(Tons of 2,240 lb.)				
Sold for consumption in Canada	18,220			
" export to United States	3,166			
" " other countries				
Total sales		21,386		
Waste	4,011			
Used under colliery boilers, etc.	2,777			
Total for colliery use		6,788		
Stocks on hand first of year				
" last of year				
Difference { added to } stock during year				
{ taken from }				
Output of collieries for year		28,174		

NUMBER OF HANDS EMPLOYED, DAILY WAGES PAID, ETC.

CHARACTER OF LABOUR.	UNDERGROUND.		ABOVE GROUND.		TOTALS.	
	No. employed.	Average Daily Wage.	No. employed.	Average Daily Wage.	No. employed.	Average Daily Wage.
Supervision and clerical assistance	6	\$ 4.50	3	4.50	9	4.30
Whites—Miners	32	5.00			32	5.00
Miners' helpers	12	3.00			12	3.00
Labourers	14	3.30	18	3.00	32	3.00 - 3.30
Mechanics and skilled labour	10	3.75	14	3.50 - 4.00	24	3.50 - 4.00
Boys			1	1.75	1	1.75
Japanese						
Chinese						
Indians						
Totals	74	3.00 - 5.00	36	3.00 - 4.50	110	3.00 - 5.00

Name of seams or pits—No. 1 slope.

Description of seams, tunnels, levels, shafts, etc., and number of same—The seam is 24 inches thick and lies at an inclination varying from 16 to 9 degrees. The top 9 feet is worked, and is a good-grade lignite and has jet-black appearance. The slope is down a distance of 1,050 feet, driven on full pitch of the seam, with main and counter levels on strike of the seam, and 500 and 1,000 feet respectively both east and west. There is an air-shaft down to the seam and has a depth of 60 feet. Nos. 2 and 3 East levels are in 1,200 feet; No. 4 and No. 4 East counter 500 feet; No. 1 West level 600 feet; No. 2 West level and counter are in 100 feet. The coal is mined by post machines, of which six are used.

Description and length of tramway, plant, etc.—The plant consists of tippie having a length of 250 feet, with rotary dump, reciprocating feeder, shaking screen, picking-belts, and bunkers having a capacity of 240 tons; conveyor-belt and Victor box-car loader; two 75-horse-power and one 50-horse-power boilers; machine-shop containing lathe, shaper, pipe-threader, bolt-cutters, hack-saws; blacksmith and carpenter shops with steam-hammer and all necessary equipment.

United Empire Mining Co.

Capital, \$500,000.

Officers.

W. C. McDougall, President,
 E. P. Gaillac, Vice-President,
 L. E. Marston, Secretary-Treasurer,
 W. G. Simpson, Mine Manager,

Address.

Princeton, B.C.
 Princeton, B.C.
 Princeton, B.C.
 Princeton, B.C.

Value of plant, \$650.

UNITED EMPIRE COLLIERY, PRINCETON, B.C.

W. G. Simpson, Manager.

This company's property is situated on the One-mile creek, about one and one-half miles from Princeton. The main tunnel is in about 1,100 feet. The coal is lignite, the seam being 3½ feet thick, at an inclination of 60 degrees. The main tunnel strikes the coal at 900 feet in, at which point the counter-entry commences: from the counter-entry a raise has been put through to the surface, a distance of 230 feet. Ventilation is by natural draught, but a fan is to be installed in the near future. This mine was shut down all summer and was only reopened in December, at which time I found conditions rather unsatisfactory. The counter-gangway was under repair, and, although I found no trace of gas, I had occasion to find fault with the methods of ventilation. A mine manager, Mr. Simpson, has now been appointed, and I expect in future to find that the Mines Act is strictly attended to. There is no steam plant of any kind at present, all the workings being above water-level. Railway connection has now been made to this mine by the Great Northern Railway.

The following are the official returns for the United Empire Mining Company for the year ending 1912:—

SALES AND OUTPUT FOR YEAR.	COAL.		COKE.	
	Tons.	Tons.	Tons.	Tons.
(Tons of 2,240 lb.)				
Sold for consumption in Canada	100			
" export to United States	400			
" " other countries				
Total sales		500		
Used in making coke				
Used under colliery boilers, etc.				
Total for colliery use				
Stocks on hand first of year				
" last of year				
Difference taken from stock during year				
Output of collieries for year		500		

NUMBER OF HANDS EMPLOYED, DAILY WAGES PAID, ETC.

CHARACTER OF LABOUR.	UNDERGROUND.		ABOVE GROUND.		TOTALS.	
	No. employed.	Average Daily Wage.	No. employed.	Average Daily Wage.	No. employed.	Average Daily Wage.
Supervision and clerical assistance	1	\$ 3.50		\$	1	
Whites—Miners	7	3.50			7	
Miners' helpers	5	3.00			5	3.30
Labourers			1	3.00	1	
Mechanics and skilled labour						
Boys			1	2.00	1	2.50
Japanese						
Chinese						
Indians						
Totals	13		2		15	

Name of seams or pits—No. 1 seam or tunnel.

Description of seams, tunnels, levels, shafts, etc., and number of same—Tunnel 900 feet long when coal was struck, 4 feet thick, of a hard black lignite mixed with cannel; the seam pitches from 60 to 70 degrees, with a sandstone roof and a soft bottom composed of coal and fireclay. The gangway is driven on the strike of the vein, 6 feet 6 inches high and 5 feet wide at collar, and 7 feet 6 inches wide at bottom of props.

Description and length of tramway, plant, etc.—Tramway outside of tunnel, about 600 feet; no plant.

Columbia Coal and Coke Company, Limited.

Capital, \$4,000,000.

<i>Officers.</i>	<i>Address.</i>
Hon. C. H. Campbell, President,	Winnipeg, Man.
J. L. Johnston, Vice-President,	Coalmont, B.C.
W. L. Parrish, Secretary-Treasurer,	Winnipeg, Man.
G. L. Fraser, General Manager,	Coalmont, B.C.
J. W. Powell, Mine Manager,	Coalmont, B.C.

MOUNT CARBON COLLIERY.

This colliery, which is situated on the Tulameen river, between Granite creek and Collins Guleh, has a tunnel driven 2,300 feet, so as to crosscut the coal-seams which outcrop further up. This tunnel is situated 710 feet above the Tulameen river, and strikes the first seam at 1,900 feet; this seam is 16 feet thick, dipping at 40 degrees. Levels have been driven on both sides of the tunnel, that to the east for 400 feet, and that to the west for 850 feet. All the work this year has been concentrated on the west side, and consists of driving the main and counter gangways with crosscuts. Great trouble has been experienced in keeping the roadways open; consequently, the air-shaft, for a return, was driven in the foot-wall. This air-shaft runs parallel to the coal-seam for a distance of 530 feet, where it is intersected by a tunnel driven in the underlying rock 350 feet long.

In addition to the above, prospecting-work has been carried on at the "Bear's Den," which is situated about 3,500 feet north-west of the main tunnel, and about 1,000 feet higher. Here the No. 1 drift, B.D., has been driven 250 feet on the No. 3 seam; a crosscut from this seam cuts the No. 2 seam at 150 feet, and the No. 2 seam has been opened up for a distance of 100 feet.

During my inspection of the above mine I have generally found conditions good, both in respect to timber and ventilation. Although a fan has been installed, owing to the difference in elevation of the two entrances there is a natural ventilation amounting to 9,000 cubic feet a minute for the use of eight men. At the "Bear's Den" there were only two men at work; the tunnels were well timbered and there was no trace of gas.

The plant consists of two locomotive boilers, and a small air-compressor, situated about half-way between the river and the tunnel, from which the air is conveyed in 4-inch pipes to the mine.

There has been no production of coal from this mine, unless such as has been taken out in development or prospecting.

The following are the official returns for the Columbia Coal and Coke Company for the year ending 1912 :—

NUMBER OF HANDS EMPLOYED, DAILY WAGES PAID, ETC.

CHARACTER OF LABOUR.	UNDERGROUND.		ABOVE GROUND.		TOTALS.	
	No. employed.	Average Daily Wage.	No. employed.	Average Daily Wage.	No. employed.	Average Daily Wage.
Supervision and clerical assistance		\$	3	\$	3	\$
Whites—Miners	15	3.50		7.00	15	3.50
Miners' helpers	15	3.00			15	3.00
Labourers	2	3.00	15	3.00	17	3.00
Mechanics and skilled labour			10	4.00	10	4.00
Boys						
Japanese						
Chinese			10	2.25	10	2.25
Indians						
Totals.....	32		38		70	

Name of seams or pits—Nos. 1, 2, and 3.

Description of seams, tunnels, levels, shafts, etc., and number of same—No. 1 tunnel, 2,000 feet, driven in the underlying rock below the seams. No. 1 West drift, 700 feet on No. 1 seam; from this point an upraise 600 feet to intersect No. 2 tunnel. No. 2 tunnel driven a distance of 350 feet in the underlying rock; No. 1 drift, B.D., 250 feet of No. 3 seam; crosscut from this seam to No. 2 seam in the underlying strata, 160 feet; drift on No. 2 seam, 100 feet.

EAST KOOTENAY DISTRICT.

Until within the year 1909 there was only one company actually producing coal in the East Kootenay District—that is, the Crow's Nest Pass Coal Company, although this company operated three separate collieries; but during that year two new companies began to produce—namely, the Hosmer Mines, Limited, at Hosmer, and the Corbin Coal and Coke Company, at Corbin. These new companies only began to ship coal towards the latter part of 1908, and, consequently, their outputs have not been large, but they have extensive and fully equipped collieries, and in the future will be important factors in the production of the district.

The district is divided into two separate Inspection Districts. The Southern East Kootenay District, under Inspector Evan Evans, with headquarters at Fernie, includes the Coal Creek Collieries and the Carbonado Collieries of the Crow's Nest Pass Coal Company, although this latter colliery has not been worked this past year. The Northern East Kootenay District, under Inspector T. H. Williams, with headquarters at Fernie, includes the Hosmer Colliery of the Hosmer Mines, Limited, the Michel Collieries of the Crow's Nest Pass Coal Company, and the Corbin Colliery of the Corbin Coal and Coke Company.

Both Inspectors now have their headquarters in the Government Rescue-station at Fernie.

SOUTHERN EAST KOOTENAY INSPECTION DISTRICT.

REPORT OF EVAN EVANS, INSPECTOR.

I have the honour, as Inspector of Coal-mines for the Southern East Kootenay District, to submit my annual report for the year 1912.

In the early part of the year the Inspector's office was transferred from Cranbrook to Fernie, thus enabling me to be nearly constantly in the coal-producing district.

During this past year the Government erected a permanent Mine-rescue Station at Fernie, which has all the necessary facilities and appliances for training persons in the use of the rescue apparatus for mine-rescue work. There is installed at the station eight 2-hour Draeger apparatus, four 2-hour of the 1909 type, four 2-hour of the 1911 model, and two $\frac{1}{2}$ -hour apparatus. The station has twenty-four tanks for supplying oxygen; one oxygen litter for the purpose of conveying a person through a body of irrespirable gases, at the same time giving the person a supply of oxygen; also one Draeger pulmotor for artificial respiration and a full supply of the necessary equipment. The rescue-station is under the supervision of an instructor who is always present to instruct persons in the use of mine-rescue apparatus. I may state that a large number of persons are undergoing instruction.

I regret to state that the number of fatal accidents in and about the mines was large; most of the accidents are attributed to falls of coal or rock and to haulage, some of the accidents occurring under very peculiar circumstances.

At Coal creek a serious accident occurred on the surface on December 30th by a snow-slide demolishing the carpenter-shop and electric shop, thereby causing six fatal accidents, six seriously and two slightly; the snowslide occurred a few minutes after 7 in the morning, at the time the miners were entering the mines; the alarm was given, when all the miners returned and rendered assistance to recover and rescue the men entombed under the snow and debris. This accident was not attributable to the getting of coal.

 Crow's Nest Pass Coal Co., Ltd.

Capital, \$3,500,000.

<i>Officers.</i>	<i>Address.</i>
Elias Rogers, President,	Toronto, Ont.
E. C. Whitney, Vice-President,	Ottawa, Ont.
R. M. Young, Secretary,	Fernie, B.C.
Elias Rogers, Treasurer,	Toronto, Ont.
John Shanks, Colliery Manager,	Fernie, B.C.

The above company is now operating the following extensive collieries on the western slope of the Rocky mountains in the East Kootenay District, viz. :—

COAL CREEK COLLIERIES, situated on Coal creek, about five miles from the town of Fernie, on a branch railway to the mines, connecting at Fernie with the tracks of the Canadian Pacific Railway and also those of the Great Northern Railway.

CARBONADO COLLIERIES, situated on Morrissey creek and connected by a branch railway with the Canadian Pacific Railway and the Great Northern Railway at Morrissey. The colliery is about fourteen miles from Fernie by rail, in a south-easterly direction. This colliery has been shut down for more than a year.

MICHEL COLLIERIES, situated on both sides of Michel creek, on the line of the Canadian Pacific Railway, being twenty-three miles in a north-easterly direction from Fernie. This last colliery is in the Northern Inspection District.

The total gross output of the company's collieries for the past year was 950,706 tons. Of this, 324,324 tons was used in the manufacture of coke, yielding 218,954 tons, of which 167 tons of coke was added to stock, making the amount of the coke sold 218,787 tons, of which 168,530 tons was sold for consumption in Canada, and 50,257 tons was exported to the United States. The coal exported to the United States amounted to 504,250 tons, while 66,547 tons was sold for consumption in Canada.

The amount and disposition of this combined output of the company's collieries is more fully shown in the following table:—

SALES AND OUTPUT FOR YEAR.	COAL.		COKE.	
	Tons.	Tons.	Tons.	Tons.
(Tons of 2,240 lb.)				
Sold for consumption in Canada.....	66,547		168,530	
" export to United States.....	504,250		50,257	
" " to other countries.....				
Total sales.....		570,797		218,787
Used in making coke.....	324,324			
" under colliery boilers, etc.....	55,508			
Total for colliery use.....		379,832		
		950,629		
Stocks on hand first of year.....	129		607	
" last of year.....	206		774	
Difference added to stock during year.....		77		167
Output of colliery for year.....		950,706		218,954

NUMBER OF HANDS EMPLOYED, DAILY WAGES PAID, ETC.

CHARACTER OF LABOUR.	UNDERGROUND.		ABOVE GROUND.		TOTALS.	
	No. employed.	Average Daily Wage.	No. employed.	Average Daily Wage.	No. employed.	Average Daily Wage.
Supervision and clerical assistance.....	48		15		63	
Whites—Miners.....	717				717	
Miners' helpers.....						
Labourers.....	139		206		345	
Mechanics and skilled labour.....	393		208		601	
Boys.....	25		7		32	
Japanese.....						
Chinese.....						
Indians.....						
Totals.....	1,322		436		1,758	

CARBONADO COLLIERY.

The Carbonado Colliery was not operated during the year 1912.

COAL CREEK COLLIERY.

John Shanks, Manager ; Wm. McFegan, Overman ; W. J. Mazey, Fireboss.

The colliery is five miles east of Fernie. Transportation is afforded by a branch railway making connection with both the Canadian Pacific Railway and the Great Northern Railway at Fernie.

The colliery was operated continuously during the year ; the coal trade was dull during the first six months of the year, but during the latter six months of the year it revived and the colliery operated at its full capacity ; the output of the colliery during the year was 696,844 tons.

In the several mines there was used, in the getting of coal, 22,045 lb. of Monabel explosive and 11,957 lb. of Saxonite explosive in rock-work. There were 42,971 detonators and shots fired in coal, and 5,869 shots in rock ; all shots are fired with the electric battery.

Two new tunnels have been opened about 2,000 feet north-east of the tippie ; the tunnels struck the coal at a distance in of 150 feet ; the size of the tunnels is 10 x 8 feet. The seam is about 6 feet thick ; the coal has to be lowered over an incline to the tippie, but as yet no commercial shipping of coal has been made from this mine.

The general strike of the seams is approximately north and south, the seams dipping to the east at an average inclination of from 10 to 18 degrees ; in exceptional cases some of the seams have considerable undulation. The mines operating during the year are : No. 1 North mine, No. 5 and No. 9 mine, on the north side of the valley ; No. 1 south mine, No. 2, No. 3, and No. 1 east mine, on the south side of the valley. The coal from all the different mines is conveyed to the same tippie, a steel structure of 840 feet in length extending across the valley of Coal creek. The tippie is equipped with two revolving dumps, two picking-tables and screens, and two box-car loaders.

No. 5 MINE.

Jas. Stewart, Overman ; John McAlpine, Carmichael McNay, Jos. Lane, Harry Dunlap, Peter Millar, and E. T. Davies, Firebosses.

This mine is situated 3,800 feet west of the tippie ; the main entrance is by means of two tunnels ; the main tunnel is 4,200 feet in length ; the second tunnel is partly parallel with the main tunnel and, continued to No. 19 incline district, is used for both ventilation and a separate travelling-road. The dip workings of this mine are worked from No. 2 slope, which is driven to the dip for 2,450 feet from the mouth of the main tunnel. The upper workings are worked from No. 4 South level, which is at about 350 feet higher elevation than the main tunnel. No. 19 incline is driven to the full rise from a point 1,040 feet in from the mouth of No. 4 South level. The coal from No. 4 South level is lowered over a gravity-plane 1,100 feet in length, about one mile from the tippie.

The seam is from 8 to 16 feet thick, and is worked on the pillar-and-room system ; levels are turned off the inclines and slope 250 feet apart ; rooms 14 feet wide are driven up the pith of the seam ; the pillars between the rooms are generally from 40 to 60 feet wide, depending upon the thickness of the seam and nature of the roof ; all rooms and levels are timbered with framed sets.

Over the incline and slope the cars are hauled by the tail-rope system and direct method of haulage, and on the main levels by compressed-air motors.

During my inspection of this mine I seldom found gas in No. 19 incline district, the ventilation was always good; in No. 2 slope district the coal makes gas freely, and on my inspection of this district, in December, I discovered gas in the faces of Nos. 3 and 4 rooms, No. 1 South level. I also found the ventilation in No. 3 North and No. 1 South levels had from 1 to 1½ per cent. of gas in the air. The roadways through the mine are generally in good condition, except that there is considerable crushing of the timber in No. 2 slope district, due to thick coal.

Shot-firing is confined to a few places only, near the outcrop in No. 19 incline district; Wolf safety-lamps are exclusively used.

On December 6th, for No. 19 incline, I obtained 30,000 cubic feet of air a minute for fifty men and four horses; on December 13th, for No. 2 slope district, I found 18,300 cubic feet of air a minute for forty-two men and three horses. At the fan-drift I measured 127,000 cubic feet of air a minute. The ventilation is produced by a Chandler fan, 16 feet in diameter and 4 feet 8 inches wide, running 138 revolutions a minute, with a water-gauge of 2.2 inches.

No. 9 MINE.

Wm. McFegan, Overman; R. J. Brown and John Moore, Firebosses.

This mine is situated 400 feet from the tippie; the entrance to the mine is by two adit tunnels; the main tunnel is 3,350 feet in length and driven on the strike of the seam. At present operations are carried on in No. 3 incline, which has been turned to the raise at a distance of 2,920 feet from the mouth of the main tunnel. The mode of working is long-wall; levels are turned from the incline 200 feet apart, and stall-roads turned from the levels at 40-foot centres. Cogs are set along the side of the roadways 4 feet apart and packed with rock from the roof. The coal is soft and the roof is inclined to be frail. The coal from the foot of the incline is conveyed to the tippie by compressed-air motor. There is a little shot-firing in this mine in rock; shots are fired during the night-shift; Wolf safety-lamps are used exclusively. I seldom found gas in this mine; on December 17th I found the mine clear of gas and the ventilation good. The timbering and roadways are generally in good condition. I found 23,000 cubic feet of air a minute for twenty-eight men and three horses; at the fan-drift I measured 54,000 cubic feet of air a minute. The size of the fan is 16 feet in diameter, and is driven by a 16- x 18-inch engine making ninety-six revolutions a minute, water-gauge 1.2 inches.

No. 1 NORTH MINE.

Wm. Wilson, Overman; Robt. Adamson, John Chester, Chas. O'Brien, Walter Joyce, and Wm. Wesnedge, Firebosses.

This mine is situated on the north-west of the tippie; the opening is by a tunnel 300 feet vertically higher than the tippie; a second level has been driven parallel, and for part of the way this, with the main tunnel, is used for ventilation. The coal from the main tunnel is lowered over a gravity-plane, 3,000 feet from the tippie. The seam varies from 8 to 35 feet in thickness; at present only the lower portion of the seam is worked.

Nos. 2 and 3 inclines have been driven to the rise, 1,000 feet apart; in No. 2 incline workings rooms are turned off the incline 60 feet apart, and the rooms are connected by crosscuts 60 feet apart, making the pillars 60 x 60 feet.

In this district I seldom found gas and the ventilation was good; the timbering and roadways were also in good condition. In this district I measured 11,200 cubic feet of air a minute passing for thirty-two men and two horses. In No. 3 incline district the rooms are turned off the incline 150 feet apart, and are connected by crosscuts 80 feet apart, thus making the pillars 150 x 80 feet. All the roadways are timbered with framed sets 8 feet high.

In this district the coal is very thick, averaging 35 feet. About 2 to 4 feet above the timbers there is interbedded in the coal-seam a bed of soft shale 18 inches to 2 feet thick; this causes the timbers to be much crushed along the roadways, and a large force of men has to be kept to repair the roadways; the lower portion of the seam is of good quality. The coal in this district makes gas freely, and on a few occasions I have found gas in a few places in this district.

The ventilation generally is good throughout the district. In this district I measured 20,800 cubic feet of air a minute passing for fifty-two men and six horses. Shot-firing is confined to No. 2 incline district, and Wolf safety-lamps are exclusively used throughout the mine. The ventilation is produced by a force-fan, 5 feet in diameter and 2 feet wide, running 300 revolutions a minute and moving 38,000 cubic feet of air a minute.

NO. 1 SOUTH MINE.

A. G. Watson, Overman; Thos. Ratcliffe, Wm. Stockwell, and Wm. Commons, Firemen.

This mine is 2,500 feet south-west of and 200 feet vertically higher than the tittle; the entrance is by two adit tunnels, 1,800 feet in length, driven on the strike of the seam. The main incline is 900 feet in length and driven to the rise at a distance of 1,300 feet in from the mouth of the main tunnel. The seam averages 30 feet thick; the mode of working is by pillar and room; about 10 feet of the upper portion of the seam is worked. Rooms are turned off the incline 150 feet apart, and these are connected by crosscuts from 60 to 150 feet apart, turned up from the rooms. All roadways are timbered with notched timbers. The cars on the incline are lowered with the tail-rope system of haulage, conveyed to the mouth of the tunnel by horses, and then lowered over a gravity-plane to the main tram-road, on which it is conveyed to the tittle by an electric motor.

On my last inspection, in December, I found a small quantity of gas in face of crosscut off 4 right; the ventilation is good throughout. The timbering and roadways are generally in good condition. I found 22,500 cubic feet of air a minute passing through for fifty-one men and six horses. There is no shot-firing in this mine, and Wolf safety-lamps are exclusively used throughout. The ventilation is produced by a force-fan, 5 feet in diameter by 2 feet wide, running 450 revolutions a minute, water-gauge $\frac{1}{2}$ inch.

NO. 2 MINE.

Wm. Lancaster, Overman; Frank Landers, Jas. Bushell, and H. Lanfear, Firemen;
Walter Clarkson, Shotlighter.

This mine is situated on the south side of the valley and in line with the tittle; the opening is by means of a tunnel; the workings are at present in No. 1 or Highline district and No. 2 or Rock tunnel district. In both districts the mode of working is by pillar and stall.

No. 1 District.—In the No. 1 district the workings are in the upper part of the incline, which is at a distance of 1,400 feet in from the mouth of the tunnel. When inspecting this district I have always found the working-places clear of gas and the ventilation good, and the working-places well timbered. I found 36,000 cubic feet of air a minute in circulation for twenty-two men and three horses.

No. 2 District (or Rock Tunnel).—About 1,450 feet in from the mouth of the tunnel a slant was driven to the left from the main tunnel, and was continued parallel with the rock tunnel after the slant had reached the level course. When I made my inspection of this district, in December, I found the working-places clear of gas and the ventilation good, with the roadways in good condition. I measured 9,000 cubic feet of air a minute for ten men and one horse.

These districts are ventilated by the No. 2 Highline fan, and I found 96,000 cubic feet of air a minute travelling in the fan-drift. The size of the fan is 18 feet in diameter and 8 feet wide, running 120 revolutions a minute, against a water-gauge of 2.9 inches. Shot-firing is confined to the upper part of the Highline district, and Wolf safety-lamps are used in the mine.

At present the old rock tunnel is being reopened; it is the intention of the management to open up entirely new work in a new region, on the rise side of the rock tunnel. I may state that connection has been made by a rock-drift from the old rock tunnel to the Old South level in the Highline district; this will be used for the return airway from the new district and will be ventilated with the No. 2 Highline fan.

No. 3 MINE.

H. E. Miard, Overman; John Biggs, John Worthington, and W. R. Puekey, Firemen.

In this mine the same seam is being worked as in No. 2 mine; all the workings are to the dip. The mine is entered by means of a slope 2,250 feet in length, commencing from underneath the tittle. At a point 1,450 feet in from the mouth of the slope, No. 2 South level, 1,950 feet in length, has been driven towards the south; at its termination, No. 3 slope has been sunk to a depth of 1,800 feet, where it struck some rock; the coal is of good quality and the seam is 3 to 4 feet thick. The system of working is long-wall; levels are turned off, on both sides of the slope, 200 feet apart; 125 feet from the slope, slants are driven up half across the pitch from the levels, and stall-roads are driven off the slants at 40-foot centres; cogs are set along the side of the roads 4 feet apart, and the waste or gob is filled and packed from the floor-brushings.

With one exception, I have always found this mine free from explosive gas and the ventilation good, except a small percentage of gas in the air in faces of the 2nd right off the slope. The timbering and roadways are generally in good condition. Shot-firing is carried on in this mine and Wolf safety-lamps are used exclusively.

In No. 3 mine I found 38,000 cubic feet of air a minute passing for fifty-three men and eight horses. This mine is ventilated with the old No. 2 fan; at the fan-drift I measured 132,400 cubic feet of air a minute, with the fan running 100 revolutions a minute and a water-gauge of 1.9 inches. The size of the fan is 16 feet in diameter and 8 feet wide, of the Wilson type.

No. 1 EAST MINE.

David Martin, Overman; John Caulfield, Tom Wilson, and John Baggley, Firemen;
John Mawson and Alex. McFegan, Shotlighters.

Practically, this is a new mine situated 800 feet to the east of the tittle; the entrance is by means of a rock tunnel 215 feet in length; the tunnel is 90 feet vertically higher than the tittle; the size of the tunnel is 11 x 8 feet; the seam is from 8 to 9 feet thick, although considerably more in places.

The total length of the main entries from the mouth of the tunnel is 1,800 feet, and driven towards the south; from the main entries at 1,600 feet in a pair of entries are being driven to the right and left. A diagonal entry, 1,500 feet in length and running south-east is being driven, commencing from a point 300 feet from the entrance of the tunnel. The main dip, 1,200 feet in length, is being driven on the "full dip" of 10 degrees, commencing from a point 400 feet from the tunnel-mouth. The size of the entries is 10 x 8 feet; the system of working is mainly pillar and stall; the rooms and crosscuts are arranged to have pillars 150 x 300 feet. All places are timbered with notched timbers; parts of the mine are very wet. The haulage from the main dip is by direct system of haulage operated by a 75-horse-power electric motor. The cars from the mine are lowered to the tippie over a gravity-plane 800 feet in length. Shot-firing is carried on in parts of this mine and Wolf safety-lamps are used.

On my inspection, in December, I found a little gas above the timbers in Nos. 7 and 8 rooms off the diagonal and in No. 1 water level. The ventilation was good; both timbering and roadways were in good condition. For the right side of the mine I found 24,600 cubic feet of air a minute passing for sixty men and five horses; for the left side I measured 32,000 cubic feet of air a minute for thirty men and four horses.

No. 1 East mine is ventilated by the old No. 2 fan; the main return airway is a rock tunnel, rising 1 in 4, driven from No. 2 dip entry, 550 feet from the mouth of No. 2 tunnel; the air return to the fan is through No. 2 dip workings. In the return airway I measured 70,000 cubic feet of air passing a minute.

In compliance with section 106, "Coal-mines Regulation Act," there is installed at the colliery the following appliances for mine-rescue work: Two 2-hour Draeger apparatus, two 2-hour apparatus of the Proto type, six $\frac{1}{2}$ -hour apparatus of the Draeger type, two Draeger pulmotors, and one respirator, also 750 cubic feet of oxygen and other necessary equipments. The general and special rules are posted up at the entrance of each mine.

The following are the official returns for the Coal Creek Colliery for the year 1912:—

SALES AND OUTPUT FOR YEAR.	COAL.		COKE.	
	Tons.	Tons.	Tons.	Tons.
(Tons of 2,240 lb.)				
Sold for consumption in Canada	55,294		107,418	
" export to United States	384,658		41,952	
" " to other countries				
Total sales.....		439,952		149,370
Used in making coke	221,363			
Used under colliery boilers, etc.....	35,537			
Total for colliery use.....		256,900		
		696,852		
Stocks on hand first of year	111		446	
" last of year	103			
Difference taken from stock during year				446
Output of colliery for year		696,844		148,924

NUMBER OF HANDS EMPLOYED, DAILY WAGES PAID, ETC., INCLUDING FERNIE COKE-OVENS.

CHARACTER OF LABOUR.	UNDERGROUND.		ABOVE GROUND.		TOTALS.	
	No. employed.	Average Daily Wage.	No. employed.	Average Daily Wage.	No. employed.	Average Daily Wage.
Supervision and clerical assistance .	36	.....	8	.....	44	.....
Whites—Miners	493	.....			493	.....
Labourers	122	.....	135	.....	257	.....
Mechanics & skilled labour.	365	.....	163	.....	468	.....
Boys	25	.....	6	.....	31	.....
Japanese						
Chinese						
Indians						
Totals	981	.....	312	.....	1,293	.....

Name of seams or pits—No. 1 North, No. 1 South, No. 1 East, No. 2, No. 3, No. 5 North, and No. 9; No. B seam under development.

Description of seams, tunnels, levels, shafts, etc., and number of same—Same as last year. No. B seam is being developed on the four-way system.

Description and length of tramway, plant, etc.—Same as last year. A Wilson fan, 16 feet in diameter, 8-foot blade, was installed during the latter part of 1910 and completed in 1911 on the Highline workings of No. 2 mine. This fan has a capacity of 130,000 cubic feet of air a minute, against a 3-inch water-gauge.

NORTHERN EAST KOOTENAY INSPECTION DISTRICT.

REPORT OF T. H. WILLIAMS, INSPECTOR.

I have the honour to submit the annual report as Inspector of Coal-mines for the Northern East Kootenay Inspection District for the year 1912.

This district was in 1911 created a separate division with headquarters at Hosmer, and includes all the mines from Hosmer to the eastern boundary of British Columbia.

The office of this district, formerly located at Hosmer, was, in March, 1912, removed to Fernie, temporary quarters being provided in the Government building, pending the erection of the Mine-rescue Station, which is the present headquarters for the whole of the East Kootenay Inspection District.

The mines at present being operated are as follows: Hosmer Colliery, by the Hosmer Mines, Limited; Michel Colliery, by the Crow's Nest Pass Coal Company, Limited; and Corbin Colliery, by the Corbin Coal and Coke Company, Limited.

I regret to state that the number of accidents during the year has been large, six fatal and twenty-seven non-fatal being reported. Two of the fatal ones were caused by a fall of coal, two by a fall of rock, and two by haulage.

Crow's Nest Pass Coal Company.*

MICHEL COLLIERY.

B. Caufield, Manager.

This colliery, operated by the Crow's Nest Pass Coal Company, Limited, is situated on both sides of Michel creek, and comprises Nos. 3, 4, 5, and 3 East on the south side of the creek, and Nos. 7 and 8 on the north side.

Operations were confined chiefly during the year to the south side, no attempt having been made to reopen No. 8, which, owing to a fire, was sealed off in May, 1911.

No. 3 MINE.

W. Robinson, Overman; R. Spruston, A. Frew, A. Matuskey, J. Touhey, M. Littler, and J. Henney, Firebosses.

This mine is 970 feet from the mouth of the main tunnel, which successively cuts Nos. 5, 4, and 3 seams. As mentioned in the last report, the method of working this mine was changed from pillar and stall to long-wall, but after experimenting for some little time the management decided to revert to pillar and stall, which is the present method of work. The whole of the coal produced during the year was from Nos. 2 and 3 slopes, which have reached a depth of 1,500 and 900 feet respectively.

Upon my last inspection I found explosive gas in No. 8 East, off No. 2 slope. With the exception of a few places, in which the centre posts were too far back from the face, the timbering was good, and all roadways and airways were in good condition. The ventilation is effected by three splits, as follows: East side of No. 2 slope, 16,875 cubic feet a minute for thirty men and four horses; west side of No. 2 slope, 22,500 cubic feet a minute for twenty-eight men and six horses; No. 3 slope, 15,300 cubic feet a minute for twenty men and four horses. This ventilation is produced by an 8- x 16-foot Wilson fan, giving 12,000 cubic feet a minute, with a 3-inch water-gauge, while running at a speed of 150 revolutions a minute.

Considerable work has been done towards improving the ventilation in this mine during the past year, a new rock tunnel is being driven from No. 5 to No. 3 seam, which, when completed, will permit No. 3 mine to be ventilated with No. 5 fan (instead of with No. 4 fan as at present), thus greatly reducing the length of the return airway, and doing away with the long circuitous route which the air has to travel to this fan. A new line of stoppings has been built on each side of No. 2 slope, and a great deal has been done in enlarging old airways and making new ones. The rock tunnel referred to is in 600 feet, and is expected to be complete early in February. The No. 5 fan, which will then be used to ventilate this mine, is a 6- x 12-foot Sullivan, capable of producing 150,000 cubic feet of air a minute with a 2-inch water-gauge.

The coal is all pick-mined, and no blasting is done.

No. 3 EAST MINE.

T. Cunliffe, Overman; E. Hayes, J. Mason, and W. Whitehouse, Firebosses.

This mine is situated about 2,000 feet south-east of the tippel, and is known also as No. 8 South. The seam is 12 feet in thickness and is worked on the pillar-and-stall method. The main slope is down 1,400 feet, at which point it met with a down-throw fault.

At the time of my last inspection I found small quantities of explosive gas in four places: with these exceptions, the mine was in good condition and well timbered.

See also page 295.

The small fan which formerly ventilated this mine has been replaced by an Allis-Chalmers-Bullock fan 8 feet in diameter, and capable of producing 80,000 cubic feet of air a minute, against a 2-inch water-gauge. The ventilation showed 56,000 cubic feet a minute for the use of forty-eight men and eleven horses, divided into three splits, as follows: No. 1 East split, 9,000 cubic feet a minute for ten men and five horses; East side of slope, 20,000 cubic feet a minute for eighteen men and three horses; West side of slope, 20,000 cubic feet a minute for twenty men and three horses. The fan was making 280 revolutions a minute, against a 1-inch water-gauge. Horse-haulage is employed to take the coal from the mine to the tippie.

The only work done on the north side has been the driving of a prospect tunnel to locate No. 8 seam. This tunnel has an elevation of 475 feet above the tippie, and is 2,000 feet north of the entrance to No. 8 mine. Upon my last inspection it was in about 80 feet, and had struck the coal. Owing to the inclemency of the weather, operations were suspended early in December. Wolf safety-lamps are used throughout at this colliery.

The following are the official returns from the Michel Colliery for the year 1912:—

SALES AND OUTPUT FOR YEAR.	COAL.		COKE.	
	Tons.	Tons.	Tons.	Tons.
(Tons of 2,240 lb.)				
Sold for consumption in Canada.....	11,253		61,112	
" export to United States.....	119,592		8,305	
" " other countries.....				
Total sales.....		130,845		69,417
Used in making coke.....	102,961			
Used under colliery boilers, etc.....	19,971			
Total for colliery use.....		122,932		
		253,777		
Stocks on hand first of year.....	18		161	
" last of year.....	103		774	
Difference added to stock during year.....		85		613
Output of colliery for year.....		253,862		70,030

NUMBER OF HANDS EMPLOYED, DAILY WAGES PAID, ETC., INCLUDING COKE-OVENS.

CHARACTER OF LABOUR.	UNDERGROUND.		ABOVE GROUND.		TOTALS.	
	No. employed.	Average Daily Wage.	No. employed.	Average Daily Wage.	No. employed.	Average Daily Wage.
Supervision and clerical assistance.....	12		7		19	
Whites—Miners, shaft-sinkers.....	224				224	
Miners' helpers.....						
Labourers.....	17		71		88	
*Mechanics and skilled labour.....	88		45		133	
Boys.....			1		1	
Japanese.....						
Chinese.....						
Indians.....						
Total.....	341		124		465	

*NOTE.—Mechanics and skilled labour include: Underground—Drivers, motormen, rope-riders, hoistmen, trackmen, bratticemen, timbermen, pumpmen, fannmen, and carpenters. Above ground—Lampmen, weighmaster, tipplemen, firemen, machinists, carpenters, blacksmiths, engineers, electric plant, and plumbers.

Name of seams or pits—No. 3 East, No. 3.

Description of seams, tunnels, levels, shafts, etc., and number of same—Same as last year.

There was completed during the year the driving of a tunnel 600 feet long through the rock measures for main return airway for fan which was reported last year.

Description and length of tramway, plant, etc.—Same as last year. The fan which was relieved at No. 5 mine has been installed to ventilate No. 3 East mine. This is an Allis-Chalmers-Bullock fan 8 feet in diameter, capacity 80,000 cubic feet a minute, against a 2-inch water-gauge.

Hosmer Mines, Ltd.

Head Office—Montreal.

Capital, \$1,500,000.

Officers.

W. D. Matthews, President,
 Lewis Stockett, General Superintendent,
 A. R. G. Heward, Secretary,
 H. E. Suckling, Treasurer,
 David G. Wilson, Mine Manager,

Address.

Toronto, Ont.
 Calgary, Alta.
 Montreal, Que.
 Montreal, Que.
 Hosmer, B.C.

Value of plant, \$1,000,000.

HOSMER COLLIERY.

David G. Wilson, Manager; John Musgrave, Overman, A Level; Jas. McKelvie, Overman, B Level; G. Rankin, R. Smith, S. Lynch, T. Manson, T. Wakelem, W. Rankin, J. Maltman, M. Robinson, T. J. Fitzpatrick, R. Anderson, and A. Allan, Firebosses.

This colliery has mines producing coal from two different levels, known as A and B.

A LEVEL.

John Musgrave, Overman.

The coal on this level is reached by an adit tunnel driven through the measures for a distance of 4,931 feet, crosscutting ten seams, but only three of these, Nos. 2, 9, and 10, produced coal during the year.

No. 2 Seam.—This seam has an average thickness of about 12 feet and a dip of about 60 degrees; it is worked on the pillar-and-stall system, a gangway and a counter-level being driven north and south from the main tunnel. Every 400 feet a pair of chutes are driven up the pitch at an angle of 45 degrees, from which rooms 12 feet wide, with a 38-foot pillar between them, are driven across the pitch for a distance of 200 feet. The coal from these rooms is loaded into small cars, which are pushed back by the men and dumped into the chutes. The south gangway is 3,940 feet long, and has a pillar of coal 80 feet in thickness between it and the counter-level above.

The ventilation is by two splits: North side 14,490 cubic feet a minute for twenty-five men; South side, 35,800 cubic feet for fifty-seven men. Upon my last inspection I found a little explosive gas in the south gangway; all other places were in good condition and well timbered.

No. 9 Seam.—The coal in this seam is about 5 feet in thickness, having an inclination of about 10 degrees, which enables the regular mine-cars to be taken to the face. It is worked on the pillar-and-stall method. Most of the work done during the past year has been on the south side, the main entry of which is in 2,211 feet.

The ventilation is by two splits: North side split, 3,500 cubic feet a minute for six men; and South side split, 34,000 cubic feet a minute for forty men. Upon my last inspection I found it clear of explosive gas and well timbered.

No. 10 Seam.—This seam, which is nearly 5,000 feet from the main tunnel entrance, has been permanently abandoned on the south side, and operations have been temporarily suspended on the north side. At the time of my last inspection I found explosive gas in the counter gangway; all the other places were clear and in good condition.

The ventilation on A level is produced by a Walker reversible fan, which gives 135,000 cubic feet of air a minute, with a 2.7-inch water-gauge. It is driven by a pair of 38- x 46-inch engines at a speed of 112 revolutions a minute.

The coal in parts of No. 2 seam is mined with coal-cutting machines, and blasted with Monabel powder fired by electric detonators. No blasting is done in the coal in No. 9 seam.

B LEVEL.

J. McKelvie, Overman.

This level, which is at an elevation of 500 feet above A level, has two producing mines, No. 2 North and No. 2 South. The main gangway of No. 2 North is in 1,200 feet, and that of No. 2 South 2,000 feet. The workings of No. 2 South, which is the principal mine, are separated from those of No. 2 South, A level, by a barrier pillar 100 feet in thickness. The same method of work is practised as in this seam on A level. I have never found any gas in either of these mines, and upon my last inspection I found them well-timbered and in good condition.

Each mine is ventilated by a 6-foot fan of the Guibal type, driven by a 20-horse-power electric motor, producing, in No. 2 North, 12,000 cubic feet a minute for twelve men and one horse; and in No. 2 South, 12,500 cubic feet a minute for fifty-seven men and three horses.

A Braun sampler, consisting of a pulverizer, Chipmunk crusher, and cone sampler, has been installed at this colliery to facilitate the assaying of the coal and coke. With this exception the plant is the same as last year.

The timber is all framed on the outside before being sent into the mine for use. Wolf safety-lamps are used throughout on both levels.

The following are the official returns of the Hosmer Colliery for the year ending 31st December, 1912:—

SALES AND OUTPUT FOR YEAR.	COAL.		COKE.	
	Tons.	Tons.	Tons.	Tons.
(Tons of 2,240 lb.)				
Sold for consumption in Canada.....	92,818		44,511	
" export to United States.....				
" to other countries.....				
Total sales.....		92,818		44,511
Used in making coke.....	72,581			
" under colliery boilers, etc.....	23,836		91	
Total for colliery use.....		96,417		91
		189,235		44,602
Stocks on hand first of year.....	1,687		267	
" last of year.....	695		1,044	
Difference taken from stock during year.....		992		777
Output of colliery for year.....		188,243		45,379

NUMBER OF HANDS EMPLOYED, DAILY WAGES PAID, ETC.

CHARACTER OF LABOUR.	UNDERGROUND.		ABOVE GROUND.		TOTALS.	
	No. employed.	Average Daily Wage.	No. employed.	Average Daily Wage.	No. employed.	Average Daily Wage.
		\$		\$		
Supervision and clerical assistance	14	3.50 - 6.00	11	3.00 - 13.00	25	.....
Whites—Miners	100	3.00 - 7.00	.....	.....	100	.....
Miners' helpers	100	2.75	.....	.....	100	.....
Labourers	80	2.75	88	2.47 - 3.00	168	.....
Mechanics and skilled labour	35	3.00 - 3.75	36	3.00 - 3.85	71	.....
Boys . . . . .	.....	.....	15	1.37	15	.....
Japanese . . . . .	.....	.....	.....	.....	.....	.....
Chinese . . . . .	.....	.....	.....	.....	.....	.....
Indians . . . . .	.....	.....	.....	.....	.....	.....
Totals	329	.....	150	.....	479	.....

Name of seams or pits—A level, Nos. 2, 9, and 10 seams ; B level, No. 2 seam.

Corbin Coal & Coke Company, Limited.

Head Office—Spokane, Wash.

Capital, \$10,000,000.

Officers.

D. C. Corbin, President,
Austin Corbin 2nd, Vice-President,
A. T. Herrick, Secretary-Treasurer,
E. J. Roberts, Superintendent,
R. T. Stewart, Mine Manager,

Address.

Spokane, Wash.
New York, N.Y.
Spokane, Wash.
Spokane, Wash.
Corbin, B.C.

Value of plant, \$311,115.

CORBIN COLLIERY.

R. T. Stewart, Manager ; S. Richards, Overman ; J. Sharp, M. McLean, R. Garbett, J. Mackie, and H. Massey, Firebosses.

This colliery, which is situated on the East fork of the South branch of Michel creek, is about fourteen miles from McGillvray Junction, on the Crowsnest branch of the Canadian Pacific Railway, and is connected to it by the Eastern British Columbia Railway.

Nearly all the coal produced last year was from No. 1 mine, in which there are two seams, dipping nearly vertical, and varying in width from 4 to 150 feet. These are known as "A" and "A prime." The main entry of the latter, which is in about 2,000 feet, has not been advanced any during the year. There are four main tunnels, A, B, D, and E ; A being the main haulage tunnel, and B, which is a counter to it, the main air-intake tunnel. In addition to the above levels, Nos. 2 and 4 in the A seam have been driven to the surface, and are maintained as travelling-roads, thus providing six exits.

The method of working is pillar and stall, main raises being driven up at an angle of about 65 degrees, from which levels are turned off at right angles, and about 40 feet apart. These levels are driven parallel with the seam, rooms being turned off them at right angles and driven to the wall. The coal from these places is loaded into cars having a capacity of 1 ton, which are pushed back by the men and dumped into the chutes.

During my inspection of this mine I found it free from gas, well-timbered, and in good condition. The timber used in the levels, rooms, and raises is framed on the outside before being sent into the mine.

The ventilation is produced by a 4- x 12-foot fan, which gives 38,000 cubic feet of air a minute, with a $\frac{3}{10}$ -inch water-gauge. This air is divided into four splits, as follows: A split, 3,000 cubic feet a minute for four men; A Prime split, 12,500 cubic feet a minute for thirty men; D split, 16,000 cubic feet a minute for thirty-six men and one horse; E split, 4,000 cubic feet a minute for eight men.

Monabel powder is used for blasting the coal, and is fired by electric detonators. Wolf safety-lamps are used throughout the mine.

The equipment of Draeger rescue apparatus has been augmented during the year by a pulmotor. The length of tramway and description of plant is the same as last year.

As mentioned in last year's report, steps were taken to wash the surface off what is generally supposed to be a continuation of these seams at a point about two miles south of No. 1 mine, and which is known as the "Big Showing" or No. 3 mine. The coal that was exposed after washing was mined in an open-cut, and loaded into dump-cars, which were conveyed by hand to a bunker, from where it was taken by teams to a temporary tippie near No. 1 mine, and reloaded into railway-cars; this method did not prove satisfactory and was abandoned early in the year.

Operations were resumed in the summer, considerable work being done towards developing this mine and putting it on a shipping basis. The railway was extended from Corbin to the mine, and a stripping-machine installed to remove the cover overlying the coal at this place, but, owing to the early advent of winter and an exceptionally heavy snowfall, work was suspended for the season about the middle of October, before the actual mining stage was reached.

The following are the official returns from the Corbin Colliery for the year 1912:—

SALES AND OUTPUT FOR YEAR.	COAL.		COKE.	
	Tons.	Tons.	Tons.	Tons.
(Tons of 2,240 lb.)				
Sold for consumption in Canada	71,711			
" export to United States	47,492			
" " other countries				
Total sales		119,203		
Used in making coke				
Used under colliery boilers, etc.	3,060			
Total for colliery use		3,060		
Stocks on hand first of year				
" last of year				
Difference { added to } stock during year				
{ taken from }				
Output of collieries for year		122,263		

NUMBER OF HANDS EMPLOYED, DAILY WAGES PAID, ETC.

CHARACTER OF LABOUR.	UNDERGROUND.		ABOVE GROUND.		TOTALS.	
	No. employed.	Average Daily Wage.	No. employed.	Average Daily Wage.	No. employed.	Average Daily Wage.
Supervision and clerical assistance	6	.....	8	.....	14	.....
Whites—Miners	60	.....	.....	.....	60	.....
Miners' helpers	55	.....	.....	.....	55	.....
Labourers .....	.....	.....	30	.....	30	.....
Mechanics and skilled labour	8	.....	6	.....	14	.....
Boys .....	.....	.....	.....	.....	.....	.....
Japanese .....	.....	.....	.....	.....	.....	.....
Chinese .....	.....	.....	.....	.....	.....	.....
Indians .....	.....	.....	.....	.....	.....	.....
Totals	129	.....	44	.....	173	.....

Name of seams or pits—A and A 1.

Description of seams, tunnels, levels, shafts, etc., and number of same—Strike of seam is S. 18° W. and dip 70 degrees east to vertical. Outcrop along crest of ridge running south, width 4 to 150 feet. There are four main tunnels, A, B, D, and E. A is the lower and main haulage tunnel, 9 x 14 feet in the clear and 2,200 feet long; B, D, and E are 9 x 10 feet in the clear. There are five levels, about 40 feet apart, between B and D tunnels, and six levels, 40 feet apart, above E tunnel. There are no shafts, the tunnels and levels being connected by 6- x 10-foot raises.

Description and length of tramway, plant, etc.—Tramway is 950 feet long; 360 feet of this on trestles leading to coal-bins, having 1,000 tons capacity. Power plant—Two 50-horse-power boilers, locomotive type; two 120-horse-power boilers, tubular type; one 80-horse-power engine and dynamo; one Rand high-pressure air-compressor; two Porter air-locomotives; one fan-engine and 4- x 12-foot ventilating-fan.

SUMMARY—TABLE SHOWING ACCIDENTS OCCURRING IN B.C. COLLIERIES IN TEN YEARS—1903 TO 1912.

For the year	1903.			1904.			1905.			1906.			1907.			1908.			1909.			1910.			1911.			1912.			Total for 10 years.													
	Fatal.	Slight.	Total.	Fatal.	Slight.	Total.	Fatal.	Slight.	Total.	Fatal.	Slight.	Total.	Fatal.	Slight.	Total.	Fatal.	Slight.	Total.	Fatal.	Slight.	Total.	Fatal.	Slight.	Total.	Fatal.	Slight.	Total.	Fatal.	Slight.	Total.														
Output of coal—tons.			1,481,913			1,685,698			1,825,832			1,899,076			2,219,608			2,109,387			2,400,600			3,139,235			2,193,062			3,025,709			21,980,120											
No. persons employ'd			4,264			4,453			4,407			4,805			6,059			6,095			6,418			7,758			6,873			7,130			58,262											
Nature of Injury.																																												
Cause of Accident.																																												
Explosion (cause un-known).			14			14																																						
Gas explosions	21	16	37	7	8	15	9	9	1	1	1	1	1	1	1	1	8	9	32	7	39	6	6	10	10	7	2	3	12	69	3	86	158											
Falls of coal.	4	5	2	11	5	12	1	18	2	8	3	13	5	6	3	14	3	6	10	19	7	4	18	5	16	5	26	3	5	6	14	4	7	9	20	46	87	50	183					
" rock	8	8	4	20	4	7	1	12	4	6	1	11	7	8	17	5	10	7	22	6	13	9	28	8	15	12	35	5	24	29	5	9	10	24	49	88	83	220						
Mine cars and horses	5	7	2	14	3	15	5	23	3	9	8	20	2	13	13	28	8	22	15	35	6	17	24	47	11	49	23	83	5	7	18	30	5	10	10	25	49	168	133	350				
" timber	1	2	3	2	2	2	3	3	1	1	2	1	1	2	4	1	3	4	2	3	5	1	4	7	5	5	5	1	2	2	5	5	22	14	41									
Hoisting, ropes, &c.	4	1	5	2	2	2	2	2	1	1	3	2	1	3	3	3	4	5	3	3	3	3	3	2	4	6	1	2	3	7	6	16	4	22	20	46								
Powder, &c., explo'n	1	7	8	1	1	2	1	3	5	1	2	1	2	4	7	2	4	6	1	3	5	1	3	5	1	3	5	1	2	3	2	1	3	8	17	21	46							
Underground—Miscellaneous.									2	1	3	2	3	5	1	4	6	4	2	5	11	2	2	6	1	4	9	4	5	9	4	4	8	12	17	28	57							
On surface—miscellaneous.	2	1	3	3	3	3	6	1	2	3	1	3	2	6	10	9	2	21	2	4	3	9	3	5	4	12	1	4	11	19	1	2	3	6	28	36	33	97						
	42	33	26	101	37	41	16	94	12	30	26	68	15	36	32	83	31	61	62	154	18	50	52	120	57	47	59	163	28	95	66	189	16	23	82	121	28	44	47	119	284	460	468	1212

ACCIDENTS IN BRITISH COLUMBIA COLLIERIES DURING 1912.

CAUSES OF ACCIDENT AND NATURE OF INJURY.	NAME OF COLLIERY.																TOTAL FOR 1912.											
	Nanaimo.		Eaten-sion.		Comox.		S. Wel-lington.		E. Wel-lington.		Mid-dles-boro.		Prince-ton.		Crow's Nest.		Hosmer.		Corbin.		Other Collier-ies.		Fatal.	Seri-ous.	Slight.	Total.		
	Fatal.	Seri-ous.	Fatal.	Seri-ous.	Fatal.	Seri-ous.	Fatal.	Seri-ous.	Fatal.	Seri-ous.	Fatal.	Seri-ous.	Fatal.	Seri-ous.	Fatal.	Seri-ous.	Fatal.	Seri-ous.	Fatal.	Seri-ous.	Fatal.	Seri-ous.					Slight.	
Gas—Explosion of																												
Fatal																												
Seri-ous																												
Slight																												
Falls of Coal.																												
Fatal																												
Seri-ous																												
Slight																												
Falls of Rock																												
Fatal																												
Seri-ous																												
Slight																												
Mine Cars and Horses																												
Fatal																												
Seri-ous																												
Slight																												
Shots or Powder																												
Fatal																												
Seri-ous																												
Slight																												
Ropes, Hoisting or Haulage																												
Fatal																												
Seri-ous																												
Slight																												
Post or Timber																												
Fatal																												
Seri-ous																												
Slight																												
Miscellaneous—Underground																												
Fatal																												
Seri-ous																												
Slight																												
Miscellaneous—Surface																												
Fatal																												
Seri-ous																												
Slight																												
Total	3	3	2	1	6	5	4	9	6	1	4	2	1	4	2	1	4	4	1	1	4	2	1	4	2	1	4	2
Number of men employed	1,459	862	1,217	365	187	310	110	1,758	479	173	210	7,130																

ANALYSES OF ACCIDENTS DURING YEAR 1912.

	NO. OF ACCIDENTS PER 1,000 MEN EMPLOYED.				TONS OF COAL MINED PER ACCIDENT.			
	Fatal.	Serious.	Slight.	Total.	Fatal.	Serious.	Slight.	Total.
East Kootenay District	5.35	8.30	7.47	21.12	97,016	63,061	70,070	24,730
Coast District	3.18	5.08	6.14	14.40	117,633	73,520	60,845	25,948
Total Province	3.93	6.17	6.59	16.69	108,061	68,766	94,376	25,426

PER CAPITA PRODUCTION OF COLLIERIES.

	Gross tons of coal mined in 1912.	Total number of men employed by collieries.	Tons of coal mined per man employed at collieries.	Number of men employed underground in collieries.	Tons of coal mined per man employed underground.
East Kootenay District.....	1,261,212	2,410	523	1,780	709
Coast District	1,764,497	4,720	353	3,435	595
Total for Province.....	3,025,709	7,130	424	5,275	573

DETAILED STATEMENT OF ACCIDENTS IN B.C. COLLIERIES DURING 1912.

COAST COLLIERIES.

REPORTED BY THOMAS MORGAN AND JOHN NEWTON, INSPECTORS.

No.	Colliery.	Date.	Name.	Occupation.	Details.
1	East Wellington. (V. & N.)	Jan. 4	Thos. Rimron	Miner	In No. 2 Dip stall off East level, a piece of roof-rock fell through lag-gings and bruised him.
2	Nanaimo (W. Fuel)	" 8	Wm. Moore	Timberman's [helper.	Moore, who had taken the place of the pointsman, was standing between an empty trip attached to a motor, and two loads moving towards the shaft, the motor started, causing one car to jump the track and others to overturn; he was caught and sustained crushed hip and back; died Jan. 12.
3	Extension. (Can. Coll.)	" 19	Eugene Santi	Miner	Leg broken below the knee. He was standing at the face of his roadway, when a piece of coal fell from the face, No. 2 West level, No. 2 mine.
4	Extension	" 31	David Davidson . . .	Fireboss	He went in to examine the place when a piece of cap-rock fell on him; a shot had been fired the previous shift.
5	South Wellington (P.C.C.M.)	Feb. 13	George Spowart . . .	Miner	Was occupied in replacing a prop, knocked out by a shot, when a piece of rock fell and bruised him about head and back.
6	Extension	Mar. 5	Mike Lyman	"	A piece of rock fell from the rib, breaking his leg.
7	South Wellington (P.C.C.M.)	" 6	George Moore	Shotfirer	Was sounding the overhanging top coal after firing a shot when it came away and bruised his shoulders and chest.
8	Nanaimo (W. Fuel)	" 12	Louie Korchuk	Driver	Sitting on first car driving a mule, he fell and was run over by three cars; right arm and right leg broken and internal injuries; died on March 27.
9	Extension	Apr. 11	Andrew Jack	Miner	Was standing on inside of haulage-rope while lowering a car when rope came off pulley and pinned him to the wall, burning his leg.
10	"	" 11	David Wilson	"	He was sitting under a piece of cap-rock known to be loose, was stooping to pull a piece of coal when the rock fell and sprained his back.
11	"	" 12	Jas. Provin	"	He had gone into the gob out of his working-place with the driver-hoss to show him some rails, when a piece of rock fell and broke his pelvis.
12	"	" 26	Alex. McKinnon . . .	"	The fireboss had examined his place an hour previously and found it clear, but, on drilling a hole, McKinnon struck a feeder of gas, which he lighted.

ACCIDENTS IN COAST COLLIERIES.—*Continued.*

No.	Colliery.	Date.	Name.	Occupation.	Details.
13	Extension.....	May 7	Andrew Dickie....	Miner	On No. 1 incline, No. 3 mine, the loaded car jumped the track and broke the rope, and the empties dropped and cut and squeezed his legs.
14	"	" 10	Ed. Humes	Pusher.....	Squeezed about the hip when brake was taken off loaded car without his having been notified.
15	"	" 20	Geo. Simpson.....	Miner	Coal falling from face bruised him about hip.
16	Oyster Harbour..	June 1	August Mestolugh.	"	Hoisting-bucket tore off piece of sliding-board, which fell 40 feet, cutting his head.
17	Extension. . . .	July 9	Samuel Juikish....	"	When he was timbering a piece of rock fell and struck him on the back; he had been warned by overman and fireman that his place should be timbered.
18	"	" 11	W. Wilkie.....	Pusher.....	Rope came off cleves and empty car ran down slope, striking him and causing broken collar-bone.
19	"	" 13	Thos. Richardson..	Miner	Weight of roof swayed timber out and he was jammed and sustained broken thigh-bone.
20	"	Aug. 7	Mat. Voelch.....	Labourer.....	Was levelling-off a cave in the return airway and lit a small accumulation of gas with naked light; burned.
21	No. 1 Nanaimo.. (W. Fuel)	Dec. 20	Angelo Orru....	Rock-miner ...	Charging a hole with dynamite when charge exploded, driving tamping-bar into his face and neck, causing blood to enter lungs; killed.
22	Cumberland.....	Jan. 9	Chong Jim.....	Miner	Fall of roof-coal broke his arm.
23	"	" 22	Kimoto.....	"	Fall of rock from between stringers, breaking his jaw and crushed shoulder.
24	"	" 23	Jos. Santoni.....	"	Was helping to adjust a timber or a stopping when some lime was squirted out into his eye.
25	"	" 26	Vivian Keene	Runner	Lowering empty car against his back when car over ran him and crushed his foot.
26	"	Feb. 5	P. Pasquala.....	Miner	Fall of rock crushed foot.
27	"	" 7	Matt. Cinda.....	"	Ignited gas coming from cavv. which occurred after the fireboss had examined place.
28	"	" 27	J. Ridpath.....	Runner	Caught between ears and sustained broken collar-bone.
29	"	Mar. 16	Chu Wee	Tracklayer....	A shot broke through from another place and killed him.
30	"	Apr. 4	S. D. Williams....	Miner	Fall of rock bruised foot.

ACCIDENTS IN COAST COLLIERIES.—*Concluded.*

No.	Colliery.	Date.	Name.	Occupation.	Details.
31	Cumberland.....	May 23	W. Logan.....	Miner	Fall of rock from face killed him.
32	"	" 29	Angelo Murletti...	"	Was timbering when a fall of rock caused compound fracture of fibula.
33	Nanaimo..... (W. Fuel)	" 30	Victor Mackey....	Machine driller	Fall of rock fractured right thigh and ruptured kidney.
34	Van.-Nan. C. Co.	June 16	Harry Mainwaring.	Engineer	Draining boiler and was scalded on leg.
35	Cumberland.....	" 20	Mah Su.....	Miner	An empty trip jumped the track and crushed him against the rib, causing dislocated hip.
36	"	" 23	H. Anderson.....	Driver.....	Working at pump, was struck by a lever; concussion of the brain.
37	"	" 23	L. Shearer.....	Fireboss	Same accident; fracture of base of skull.
38	"	July 17	Alex. Boruski.....	Miner	Letting car down from his place when it ran over him and killed him.
39	Pacific Coast G. C.	Aug. 5	Henry Barkhause..	Driver.....	Easing cars down grade when his foot was caught in track; cars struck him, bruising back and side.
40	Cumberland.....	" 26	Ezra Coleman.....	"	Riding on trip, he stood up and was struck by a stringer; sprained back and fractured ribs.
41	Nanaimo..... (W. Fuel)	Sep. 10	Wm. J. Brown....	"	Whilst leading horse past trip his arm was caught between horse-collar and a post and broken.
42	Nanaimo..... (W. Fuel)	" 11	Chas. Smith	Machine-helper	Fall of rock bruised him about back.
43	Nanaimo..... (W. Fuel)	" 16	Sidney Drew.....	Rope-rider....	Fell under car of trip and sustained broken leg.
44	Nanaimo..... (W. Fuel)	" 24	Samuel Woodcock.	Miner	Fall of rock; bruised about back and hip.
45	V.N.C.C.....	" 27	Charles Scott.....	"	Fell off ladder and injured knee.
46	Cumberland.....	Oct. 16	Mick Wlakovitch..	Labourer.....	Fall of rock fractured skull.
47	Van.-Nan. C. Co.	" 21	John Stevenson....	Driver.....	Jammed while coupling cars, sustained cracked collar-bone.
48	Cumberland.....	Nov. 29	Chung Sam.....	"	Crushed by car; leg broken.
49	"	Dec. 27	Mah Fung Sing....	Miner	Fall of coal killed him.

NICOLA COLLIERIES.

REPORTED BY THOMAS MORGAN AND ROBERT STRACHAN, INSPECTORS.

50	Nicola Valley [C. & C.]	Jan. 9	Jos. Stanhouse....	Miner	Was sounding the roof when a piece of rock fell from side, breaking his ankle.
51	"	" 29	John Manson.....	Driver.....	Riding on his trip, fell off car and was crushed between cars and side of road; died, broken back.

ACCIDENTS IN NICOLA COLLIERIES.—*Concluded.*

No.	Colliery.	Date.	Name.	Occupation.	Details.
52	Diamond Vale...	Mar. 7	Jno. Hogg...	Pusher.....	Killed by an explosion of gas and dust caused by a small quantity of gas and dust being ignited in Nos. 13 and 14 stalls, the resulting explosion extending over a large area.
53	"	" 7	Wm. Hurd.....	Miner	Same accident; killed.
54	"	" 7	Henry J. Grimes ..	Fireman	" "
55	"	" 7	Franklin Kallia....	Miner	" "
56	"	" 7	Wm. Baxter	"	" "
57	"	" 7	Jno. Pattie	"	" "
58	"	" 7	Jno. Templeton ...	"	" "
59	"	" 7	Ralph Kolisto.....	Pusher.....	Same accident; severely burnt about face and hands.
60	"	" 7	Harry Hogg	Rope-rider	Same accident; burnt, face and hands.
61	Nic. V. C. & C. Co. (Middlesboro.)	May 14	Jno. Reid, Jr.....	Pusher.....	In front of car removing blocks when he fell and draw-bar bruised his back.
62	Middlesboro	June 6	R. J. Farquharson.	Switchman....	Injured between car and side when car left the track.
63	"	" 12	Otta Hytia.....	Miner	Samson post pulled out and fell on his leg, breaking it.
64	"	July 29	Richard Smith	Mechanic's [helper.	Caught between car and post; left arm broken.
65	Inland C. & C. .	Oct. 7	J. Kutcheson	Rope-rider	Fell off trip; received scalp-wounds.
66	Middlesboro	" 31	A. Bury	Miner	Fall of top coal broke collar-bone and bruised back.
67	Princeton C & L Co	Nov. 20	F. Pratt	Labourer.....	Fall of top coal dislocated shoulder.
68	"	Dec. 27	G. Hanna.....	Machine-helper	Fall of coal fractured two ribs.

NORTH-EAST KOOTENAY COLLIERIES.

REPORTED BY T. H. WILLIAMS, INSPECTOR.

69	Hosmer.....	May 8	A. Kunyente	Screenman....	Working on tippie, injured hand between spragg and rail.
70	Michel No. 3....	" 11	J. Cockram	Miner	Thumb caught between bumper and rail and partially amputated.
71	"	" 15	J. Crippen	"	Fall of rock killed him.
72	Hosmer.....	June 22	Vincent Kram	"	Piece of coal fell on his hand, fracturing third and fourth fingers.
73	"	July 22	Nick Bathisteth...	"	Fall of coal broke his collar-bone.
74	Michel No. 3....	Aug. 5	T. Baybutt	"	Fall of coal fractured right leg.
75	"	" 6	Herman Elmer	"	Whilst running a McGinty was caught between car and face and sustained compound fracture of left leg and laceration of right leg.

ACCIDENTS IN NORTH-EAST KOOTENAY COLLIERIES.—*Continued.*

No.	Colliery.	Date.	Name.	Occupation.	Details.
76	Hosmer.....	Aug. 9	Nick Harman.....	Miner.....	Fall of coal sprained ankle.
77	Michel.....	" 29	C. Salmo.....	Rockman.....	Piece of rock from shot fractured his right leg.
78	".....	Sep. 28	J. Altemere.....	Labourer.....	On surface, foot caught in car-haul machine and severely injured.
79	Michel No. 3.....	" 30	Martin Stancik.....	Driver.....	Killed by being crushed between car and post.
80	Hosmer.....	Dec. 13	Massime Matfield..	Miner.....	Fall of coal crushed chest and lungs.
81	Corbin No. 1....	" 23	J. Karlyevitch....	".....	Fall of rock killed him.
82	Hosmer.....	" 26	E. Thomas.....	Timberman....	Thumb injured between timbers.
83	Corbin No. 1....	Jan. 5	Mike Farrace.....	Miner.....	Pinned by cave between coal and car; fractured three ribs.
84	Hosmer.....	" 10	A. Dunsmore.....	Hoistman.....	Crushed between car and post, causing shock.
85	Michel No. 8....	" 13	J. Velpatti.....	Miner.....	Fall of coal bruised back and legs.
86	Hosmer.....	" 18	F. J. Harrison.....	".....	Struck a nail into his hand, lacerating it.
87	".....	" 18	R. Pratt.....	Teamster.....	On surface, slight injury to face, caused by another person loading ashes.
88	Michel No. 3....	" 23	J. Kempan.....	Driver.....	Lacerated thumb caused by jamming it against the wheel of a car whilst spragging.
89	".....	" 27	S. Hampton.....	".....	Partial amputation of thumb, caused by having it caught between the tail-chain hook and draw-bar of car.
90	Hosmer.....	" 30	Anton Vinger.....	Miner.....	Left index finger slightly crushed by moving timber on a car.
91	".....	Feb. 3	Fred Kurybuk.....	".....	Fall of coal caused scalp-wound and left index finger broken.
92	Michel No. 3....	" 9	Joe Grillus.....	".....	Struck his foot with pick.
93	Hosmer.....	" 20	J. Popwezruk.....	".....	Fall of coal broke leg.
94	Michel No. 3....	Mar. 5	A. Baezuk.....	".....	Finger pinched between a lump of coal and edge of car.
95	".....	" 5	E. Cividian.....	".....	Fall of coal broke leg.
96	Hosmer.....	" 14	Wasył Laba.....	".....	When coming down a chute, a miner above allowed a timber to fall, which struck Laba and caused compound fracture of leg.
97	".....	" 27	R. Doyle.....	Motorman....	In switching cars he was thrown against reversing lever on motor; sustained rupture of lung and died.
98	Michel No. 3....	" 27	H. Eccleston.....	Driver.....	Three toes crushed between bumper of runaway car and ground.

ACCIDENTS IN NORTH-EAST KOOTENAY COLLIERIES.—*Concluded.*

No.	Colliery.	Date.	Name.	Occupation.	Details.
99	Corbin No. 1....	Apr. 2	Joe Perfette.....	Miner	Fall of coal killed him.
100	Michel No. 3....	" 15	A. Ferfen.....	"	Caught between car and snubbing-post, sustaining fracture of left tibia.
101	Corbin No. 1....	" 15	John Wasnowicki..	Mine-labourer..	Killed by fall of coal.

SOUTH-EAST KOOTENAY COLLIERIES.

REPORTED BY EVAN EVANS, INSPECTOR.

102	No. 3 Coal Creek.	Feb. 28	Andrew Bierge....	Miner	While pushing car out of face he fell, and car moved back and fractured his thigh.
103	Coal Creek.....	Mar. 11	Wm. Crompton ...	"	Slipped on ice near blacksmith-shop and broke left fibula; on surface.
104	No. 2 Coal Creek.	" 15	Frank Brindley ...	Driver.....	Driving out a trip, horse turned; his leg was caught between the car and gun and fractured.
105	No. 1 South..... (Coal Creek.)	" 29	Wm. Corlatt	Miner	Cave of rock fractured two ribs.
106	No. 1 South..... (Coal Creek.)	" 29	Wm. Whittle	"	Fall of rock killed him.
107	No. 5 Coal Creek.	May 6	Wm. Savage	"	When setting up timbers some coal fell from the face, causing fracture of both legs.
108	No. 1 North..... (Coal Creek.)	June 27	Joseph Szpila	Mine-labourer.	Run over by car on incline and killed.
109	No. 2 mine.....	Aug. 14	Albert Whitehouse.	Motorman's [helper.	Was riding on the motor when a pipe struck him, injuring buttock and testicles.
110	No. 3 mine.....	" 19	Richard Hembrow.	Driver-boss ...	Was attaching drag to loaded trip; when trip started, the rope broke and car ran over and killed him.
111	Coal Ck. surface.	Sept. 5	Ralph Gash.....	Motorman's [helper.	While uncoupling cars on surface from motor he fell under cars and sustained two fractured legs and fractured right arm; died twelve hours later.
112	No. 5 mine..... (Coal Creek.)	" 6	James McPherson..	Fireboss	While examining a place after firing a shot some coal fell and dislocated his left hip.
113	No. 1 East	" 16	John Caulfield	"	Amputation of second and third fingers of right hand by being crushed by driving-gear pinion of a pump.
114	No. 3 Coal Creek.	" 21	Henry Waters	Timberman's [helper.	Waters was removing rock when a boom broke and caught his wrist; He became excited and died of fright.
115	No. 5 Coal Creek.	" 23	Mike Scarpino	Miner	Fall of coal fractured femur; died four weeks later.
116	No. 1 North	Oct. 9	James French.....	Rope-rider....	Cars running over him caused broken clavicle.

ACCIDENTS IN SOUTH-EAST KOOTENAY COLLIERIES.—*Concluded.*

No.	Colliery.	Date.	Name.	Occupation.	Details.
117	No. 1 East (Coal Creek.)	Oct. 19	Harold Bird	Rope-rider	Amputation of first and second fingers of left hand by a car running over him.
118	No. 2 Coal Creek.	Nov. 18	Peter Butala	Miner	Fall of rock at the face killed him.
119	No. 3 Coal Creek.	" 18	Modeste Theodolez.	"	Sustained broken clavicle by being crushed between car and roof.

PROSECUTIONS UNDER "COAL-MINES
REGULATION ACT."

As is incumbent upon the Inspector, he has been obliged to lay information before the local Magistrates in a large number of cases for infractions, by the workmen in the mines, of the general and special rules, which are provided solely for their own protection. These regulations are for the general safety of all the underground employees, and the carelessness of one man endangers all his fellow workmen, whose lives are practically in the hands of such foolishly careless or criminal person.

The following prosecutions have been brought during the year for the offences noted: the judgments given by the Magistrate being shown:—

Date.	Name.	Occupation.	Mine.	Offence charged.	Judgment.
Feb. 7	J. H. McMullan	Manager....	Comox.....	Violating (Eight-hour Act) sec. 18, "C.M.R. Act"	Fined \$10 and costs.
	T. Beard	Driver.....	"	Ditto	" 85 "
	R. McAllister.	"	"	"	" " "
	T. Coorane....	"	"	"	" " "
	J. Lewis.....	"	"	"	" " "
	A. Robertson..	"	"	"	" " "
	S. Tabacco....	"	"	"	" " "
	May Chung . . .	"	"	Violating Gen'l Rule 9 (matches in possession)	" \$10 "
	Ma Ginn.....	"	"	Ditto	" " "
	J. Sarto.....	"	"	"	" " "
	H. W. Bright- [well	"	"	"	" " "
	Ed. Woods....	"	"	Violating Gen'l Rule 12 in two cases	" \$5 in each case
Sept. 10	Benj. Browitt	Manager....	Diamond [Vale	Violation of sec. 32, "C.M.R. Act," employing fireboss who had no certificate as such	Fined \$30 and costs.
	Andrew Pilk- [enen	Miner	Middlesboro.	Charged by Inspector with gross negligence Charged with having, on July 5th, filled several dummy tamping cartridges with coal-dust, the cartridges being filled at either end with clay with intent to deceive shot-firer in No. 2 mine, Middlesboro	Certificate as manager cancelled, by inquiry under sec. 48. Mr. Stewart suspended his certificate during the Minister of Mines' pleasure.

PROSECUTIONS.—*Concluded.*

Date.	Name.	Occupation.	Mine.	Offence charged.	Judgment.
Sept. 4	Peter Myers...	Shotfirer....	Middlesboro.	Charged with firing shots in No. 4 mine, Middlesboro, these shots not being properly placed or the coal well prepared	Case dismissed.
Oct. 16	Fred Krisch...	Miner.....	Middlesboro.	Information was laid against him for having tampered with his safety-lamp in the No. 4 mine, Middlesboro, contrary to Special Rule 79	Accused fled the country.
Feb. 7	John Magistic.	".....	Michel.....	Charged with having matches in his possession in contravention of General Rule 9 of "Coal-mines Act"	Fined \$10 and costs or sixty days in gaol.
	Joseph Tipton	".....	".....	Same offence as above.....	Ditto.
Feb. 13	Thomas Janco.	".....	".....	" ".....	Fined \$5 and costs.
	John Vocaliek.	".....	".....	" ".....	" " "
	Cesar Vince...	".....	".....	" ".....	" " "
	Tom Leoskoski	".....	".....	" ".....	" " "
Aug. 14	Corbin C. & C. [Co.]	Company....	Corbin.....	Violating sec. 4 of "Coal-mines Act" in employing a boy under fourteen	Case dismissed.
Sept. 3	T. Carmillo...	Miner.....	Michel.....	Charged with breach of Special Rules in riding on a loaded trip in No. 3 mine	Fined \$10 and costs or sixty days in gaol.
	A. Bartillon...	".....	".....	Ditto.....	Ditto.
Aug. 3	Luiyi Bella- [gamba]	".....	Coal Creek..	Loading out in a car of coal, 2 lb. Monabel and four electric fuses; both explosives were in same canister	Fined \$10 and costs.

METALLIFEROUS MINES SHIPPING IN 1912.

CASSIAR.

PORTLAND CANAL MINING DIVISION.

Mine or Group.	Locality.	Owner or Agent.	Address.	Character of Ore.
Portland Canal	Glacier creek	E. J. Hearn, Secretary	Victoria	Gold, silver.
Red Cliff	Bear river	Frank Wilcox	Vancouver	Gold, copper.

EAST KOOTENAY.

GOLDEN MINING DIVISION.

Monarch	Field	J. A. Thomson	Vancouver	Silver, lead, zinc.
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FORT STEELE MINING DIVISION.

Society Girl	Moyie	J. P. Farrell	Moyie	Silver, lead.
St. Eugene	"	T. W. Bingay, Secretary	Trail	"
Sullivan	Kimberley	X. W. Burdett	Marysville	"

WEST KOOTENAY.

NELSON MINING DIVISION.

Arlington	Erie	William Holmes	Nelson	Gold, silver.
Canadian King	"	Wm. Holmes	"	"
Emerald	Salmo	R. W. Mullin	Salmo	Silver, lead.
H. B.	"	P. F. Horton	"	"
Molly Gibson	Kokanee creek	T. W. Bingay	Trail	"
Motherlode	Sheep creek	Geo. E. Farish	Sheep Creek	Gold, silver.
Poorman	Granite	E. E. Guile	Granite	"
Queen	Sheep creek	E. V. Buckley	Sheep Creek	"
Relief	Erie	A. D. Westby	Erie	Gold, silver, copper.
Queen Victoria	Nelson	O. Lachmund	Greenwood	"
Vancouver	Sheep creek	G. H. Fisher	Sheep Creek	"
Yankee Girl	Ymir	H. Mabry	Spokane	Gold, silver, lead.

AINSWORTH MINING DIVISION.

Bluesbell	Riondel	S. S. Fowler	Riondel	Silver, lead.
Hope	Ainsworth	F. R. Wolfe	Spokane	"
London Hill	Kaslo creek	R. Hendricks	Kaslo	Silver.
Number One	Ainsworth	T. Bingay	Trail	Silver, lead.
Panama	Bear lake	H. Giegerich	Kaslo	"
Silver Hoard	Ainsworth	W. S. Hawley	Ainsworth	"
Whitewater	Whitewater	W. H. Burgess	Kaslo	Gold, silver, lead.
Utica	Paddy's peak	C. F. Caldwell	"	Silver, lead, zinc.

SLOCAN MINING DIVISION.

Apex	New Denver	A. J. Becker	New Denver	Gold, silver, lead.
Hartney	"	A. H. Blumenauer	"	Silver, lead, zinc.
Hewitt	Silverton	G. Stilwell	"	"
Idaho	Alamo	Springer and Finch	"	Gold, silver, lead.
Lone Bachelor	Three Forks	A. Cameron	Three Forks	Zinc, " "
Lucky Jim	Zinco	T. G. Proctor	Victoria	"
Majestic	Payne mountain	F. H. Bourne	Revelstoke	Silver, lead.
Noble Five	Cody	T. McAllister	Sandon	"
Rambler-Cariboo	McGuigan	W. E. Zwicky	Kaslo	"
Reco	Sandon	J. M. Harris	Sandon	"
Richmond Eureka	"	T. W. Bingay	Trail	"
Rio	McGuigan	W. E. Zwicky	Kaslo	"
Ruth	Sandon	J. Anderson	"	"
Standard	Silverton	W. H. North	Silverton	"
Twilight	Sandon	J. M. Harris	Sandon	"
Vau-Roi	Silverton	Ernest Levy	Rossland	Silver, lead, zinc.

WEST KOOTENAY.—*Concluded.*

SLOCAN CITY MINING DIVISION.

Mine or Group.	Locality.	Owner or Agent.	Address.	Character of Ore.
Black Prince	Lemon creek	John C. Moen	Slocan	Silver, lead.
Eastmont	Slocan lake	E. A. Griffith	"	"
Enterprise	10-mile creek	S. S. Fowler	Riondel	"
Kilo	Lemon creek	A. Sostad	Nelson	Gold.
Meteor	"	G. H. Aylard	New Denver	Gold, silver.

REVELSTOKE, LARDEAU, AND TROUT LAKE MINING DIVISIONS.

Ajax	Ferguson	F. C. Merry	Ferguson	Silver, lead.
Silver Cup	"	"	"	"
Fidelity	Gerrard	J. E. Lamphere	Gerrard	Gold, silver, lead.
High Grade	Trout lake	J. W. Livingston	Trout Lake	Silver, lead.
Nettie L.	Ferguson	F. C. Merry	Ferguson	"
Spider	Pool creek	F. G. Wrightson	Comaplix	Gold, silver, lead.

TRAIL CREEK MINING DIVISION.

Blue Bird	Rossland	Robert Clegg	Rossland	Gold, silver, lead, zinc.
Centre Star	"	M. E. Purcell	"	Gold, silver, copper.
Inland Empire	Grenville mountain	F. E. Pearce	Paulson	Gold, silver.
I.X.L.	Rossland	R. T. Evans	Rossland	"
Le Roi	"	F. S. Peters	"	Gold, silver, copper.
Le Roi No. 2	"	E. Levy	"	" "
Nickle Plate	"	J. Ruffner	"	" "
Thoenix	"	M. Trewheila	"	" "
Richmond	"	R. Dalby Morkill	"	Gold, silver, lead.

BOUNDARY.

GREENWOOD MINING DIVISION.

Copper Mine	Greenwood	D. Moran	Danville	Silver, copper.
Elkhorn	"	C. Kenney	Greenwood	Gold, silver.
Enma	"	O. Lachmund	"	Gold, silver, copper.
Granby	Phoenix	G. W. Wooster	Grand Forks	"
Jewel	Long Lake	C. A. Banks	Greenwood	Gold, silver, lead.
Mother Lode	Greenwood	O. Lachmund	"	Gold, silver, copper.
Wellington	Phoenix	"	"	" "

OSOYOOS MINING DIVISION.

Dividend	Kruger mountain	J. C. Fisher	Spokane	Gold, copper.
Nickel Plate	Hedley	G. P. Jones	Hedley	Gold.

COAST.

NANAIMO MINING DIVISION.

Little Billy	Texada island	H. P. Fogh	Seattle	Copper, gold, silver.
Marble Bay	"	D. C. Stephens	Vananda	" "

VANCOUVER MINING DIVISION.

Britannia	Britannia mountain	J. W. D. Moodie	Britannia Beach	Copper, silver.
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LIST OF CROWN-GRANTED MINERAL CLAIMS.

CROWN GRANTS ISSUED IN 1912.

CASSIAR.

Claim.	Division.	Grantee.	Lot No.	Acres.	Date.
Alexandra	Atlin	Christopher William Andrew Nevill	912 G. 1	51.54	Jan. 17
B.C.	"	Frances Isabella Fraser	137	37.09	Dec. 26
Carnation	"	Johney Samuel Nunkove	949 G. 1	44.99	April 29
Edan	"	Simon Jacob Weitzman	959 G. 1	41.22	July 20
Eglantine	"	Samuel Martin Fraser	375 G. 1	39.07	April 19
Engineer No. 1	"	James, Alexander Konrad Wawrecka, Benj. Green Nicoll, John Dunham	19	49.0	Dec. 2
Golden Hope	"	Elizabeth Kirkland, Mary Ann Kirkland, administratrices of the estate of John Kirkland, deceased, and Fred Bovan.	160 G. 1	47.7	Mar. 15
Haines	"	Simon Jacob Weitzman	152 G. 1	29.65	July 29
Kingston	"	Margaret Creighton Gatewood	158	48.65	Dec. 26
Mable	"	Simon Jacob Weitzman	153 G. 1	17.62	July 29
Montreal	"	Louis Alphonse Pare	229 G. 1	49.37	April 19
Northern Partnership No. 2	"	James Alexander, Konrad Wawrecka, Benjamin Green Nicoll, John Dunham	20 G. 1	45.6	July 18
Regina	"	Noemie Fraser, Louis Alphonse Pare	144 G. 1	51.62	April 19
Rose Fraction	"	Rosa Lena Weitzman	960 G. 1	9.4	July 20
Treadwell	"	John Franklin Tompkins	376 G. 1	38.58	April 29
Violet	"	John Gordon Morrison	954 G. 1	51.05	April 19
Ajax	Portland Canal	Samuel Gourley	770 G. 1	42.77	May 23
Algonquin	"	International Mining Co., Ltd. (N.P.L.)	1490 G. 1	37.93	Sept. 21
Auto	"	Samuel Gourley	771 G. 1	37.59	May 23
Ben Bolt	"	Pacific Coast Exploration Co., Ltd.	775 G. 1	35.99	May 24
Ben Bolt Fractional	"	"	2325 G. 1	6.40	May 29
Ben Lomond	"	International Mining Co., Ltd. (N.P.L.)	1487 G. 1	35.83	Sept. 20
Bull Fraction	"	Fay Alfred Scott	2323 G. 1	39.28	July 11
Chicago No. 1	"	William Spurek	2317 G. 1	49.36	Oct. 16
" No. 2	"	"	2318 G. 1	29.41	Oct. 16
" Fractional	"	Neil McLeod Curran	2319 G. 1	26.94	May 29
Dandee	"	International Mining Co., Ltd. (N.P.L.)	1491 G. 1	35.01	Sept. 21
Eric	"	"	1489 G. 1	28.51	Sept. 20
Jumbo	"	Pacific Coast Exploration Co., Ltd.	774 G. 1	45.90	May 24
Ketchum	"	Vancouver-Portland Canal Mines, Ltd. (N.P.L.)	1075 G. 1	51.75	Sept. 4
Last Chance	"	Glacier Creek Mining Co., Ltd. (N.P.L.)	403 G. 1	42.7	Feb. 12
Lucky Boy	"	"	402 G. 1	32	Feb. 12
Maid of Erin	"	Samuel Gourley	773 G. 1	31.09	May 23
Manamoth	"	International Mining Co., Ltd. (N.P.L.)	1488 G. 1	48.54	Sept. 20
Micmac Fractional	"	Glacier Creek Mining Co., Ltd. (N.P.L.)	410 G. 1	2.1	Feb. 12
Minnie	"	Samuel Gourley	772 G. 1	27.43	May 23
Nellie Fractional	"	Glacier Creek Mining Co., Ltd. (N.P.L.)	412 G. 1	1.74	Feb. 12
Nellie V	"	"	404 G. 1	46.3	Feb. 12
Penetang	"	International Mining Co., Ltd. (N.P.L.)	1494 G. 1	51.65	Sept. 21
Rex	"	Samuel Gourley	769 G. 1	30.6	May 23
Riverside	"	Glacier Creek Mining Co., Ltd. (N.P.L.)	405 G. 1	51.57	Feb. 12
Silver King	"	Andrew Nelson	1385	49.01	Jan. 4
Stop and Rest	"	Vancouver-Portland Canal Mines, Ltd. (N.P.L.)	1076 G. 1	51.65	Sept. 4
Sunshine	"	"	1077 G. 1	41.84	Sept. 4
Teumisch	"	International Mining Co., Ltd. (N.P.L.)	1492 G. 1	39	Sept. 21
Weitworth	"	"	1493 G. 1	51.65	Sept. 21
Donna	Skeena	George Martin, Wm. Shannon, James B. Mathers	1252 R. 4	48.67	April 21
Emma Fractional	"	"	183 R. 4	51.10	Mar. 4
Eva	"	"	1248 R. 4	49.45	April 12
Fanny	"	"	631 R. 4	51.65	Mar. 4
Killhope	"	"	1251 R. 4	47.88	April 12
Lila	"	"	1247 R. 4	47.48	April 12
Lost Rocker	"	Francis S. Dakers	1078 G. 1	51.65	Aug. 14
Moana	"	Watson D. Noble, Edward Donahue, Wm. E. Collison, and James A. Robertson, administrators of the estate of Donald A. Robertson, deceased, intestate.	1670 G. 1	51.65	Sept. 24
Mouse	"	George Martin, Wm. Shannon, James B. Mathers	182 R. 4	51.65	Mar. 4
Pearl Fractional	"	"	1250 R. 4	48.87	April 12
Pink	"	Richard Arthur Trethewey, Joseph Ogle Trethewey	141	38.49	July 19
Reid	"	Robie Lewis Reid	1971	59.69	July 10
Rita	"	George Martin, Wm. Shannon, James B. Mathers	1249 R. 4	49.92	April 12
River Mouth	"	Frank Roundy	1074 G. 1	51.65	July 3
Scepter	"	George Martin, Wm. Shannon, James B. Mathers	632 R. 4	51.65	Mar. 4
Wellhope	"	"	633 R. 4	51.38	Mar. 4

CASSIAR.—*Concluded.*

Claim.	Division.	Grantee.	Lot No.	Acres.	Date.
Coronado	Omineca	John E. Halley, Ronald J. McDonell, Perley R. Fleming	1155 R. 5	51.65	April 19
Coronado Fractional ..	"	Ronald J. McDonell, administrator of the estate of Wm. S. McDonell, deceased, intestate	1157 R. 5	6.5	April 19
Home Run	"	John E. Halley, Ronald J. McDonell, Perley R. Fleming	1156 R. 5	46.76	May 8
Pay Roll	"	Ronald J. McDonell	2547 R. 5	46.85	May 8
Silver Star	"	Ronald J. McDonell, Jabez K. Ashman	2546 R. 5	47.81	May 8
South West	"	Jabez K. Ashman	2548 R. 5	29.87	May 8
Adonis	Queen Charlotte	Richard Arthur Trethewey, Joseph Ogle Trethewey, Peter Drummond	1865	50.24	June 24
Beaconsfield	"	John McLellan, Alex. J. Gordon	1303	48.22	Jan. 4
Capital	"	Edward Baillie	696	51.31	Dec. 9
Edmonton	"	"	697	51.65	Dec. 9
Harriet	"	Richard Arthur Trethewey, Joseph Ogle Trethewey	86	32.06	June 24
Hot Punch	"	Roger R. Hill	1978	28.03	June 24
Iron Duke	"	"	1977	35.47	June 24
Jessie	"	Peter Drummond	1861	29.8	June 24
Montreal	"	Edward Baillie	694	33.63	Dec. 9
Nelson	"	"	691	51.45	Dec. 9
Ottawa	"	"	695	49.01	Dec. 9
Quebec Fractional	"	"	702	25.28	Dec. 9
Regina Fractional	"	"	701	31.23	Dec. 9
Rosslund	"	"	690	48.02	Dec. 9
South Easter	"	John McLellan, Alexander Gordon	1302	37.55	Jan. 4
Sweet Flag	"	Leonard Rye Locke	1864	38.44	June 24
Toronto	"	Edward Baillie	693	45.37	Dec. 9
Vancouver	"	"	698	51.65	Dec. 9
Victoria	"	"	692	42.86	Dec. 9
Winnipeg	"	"	699	46.56	Dec. 9
Winnipeg Fractional	"	"	700	39.49	Dec. 9
Champion	Cariboo	Leon F. Champion, administrator of the estate of James Champion, deceased, intestate	423 G. 1	36.50	April 19

EAST KOOTENAY.

Evening Star	Fort Steele	Robert McNair, Nils Johnson, Jacob Nilson	6121 G. 1	51.10	Sept. 5
Gibraltar Fractional	"	"	6122 G. 1	8.58	Sept. 29
Golden Key	"	"	6120 G. 1	50.02	Sept. 5
Good Hope	"	Clement Hungerford Pollen	9829 G. 1	50.06	June 5
Mammoth	"	Bernhard Lundin	10316 G. 1	51.65	Oct. 16
Rose	"	Clement Hungerford Pollen	9821 G. 1	29.52	June 5
Toolips	"	"	9822 G. 1	37.51	June 5
War Eagle	"	Robert McNair, Nils Johnson, Jacob Nilson	6119 G. 1	51.65	Sept. 5
Wasa	"	Bernhard Lundin	10315 G. 1	51.65	Oct. 16

WEST KOOTENAY.

Ameythyst	Nelson	John B. Baxter	10580 G. 1	48.59	April 2
Benhurr	"	Achille Israel Marentelle, Eugene Wilson Stoner	8984 G. 1	50.30	April 13
Climax	"	"	8982 G. 1	51.65	April 13
Cornelia	"	James R. Hunnex	10614 G. 2	41.11	Jan. 17
Hillside	"	Samuel A. Hunter, Ole Larson	10442 G. 1	48.4	May 28
Last Chance	"	Achille Israel Marentelle, Eugene Wilson Stoner	8986 G. 1	44.52	April 13
Legal Tender	"	George Klavano	10823 G. 1	48.56	Nov. 13
Maple Leaf	"	Edmund C. Wragge	3292 G. 1	41.21	Jan. 18
Mayflower	"	Samuel A. Hunter, Ole Larson	10441 G. 1	51.65	May 28
Moken Bird Fractional	"	Edmund C. Wragge	3292 G. 1	12.88	Jan. 18
Nugget Fractional	"	Montie J. Morgan, Wm. B. Pool	10406 G. 1	2.66	Feb. 19
Old Dominion	"	Achille Israel Marentelle, Eugene Wilson Stoner	8983 G. 1	43.50	April 13
Peggy	"	Gertrude A. Rhodes, Frederick P. Drummond	9355 G. 1	44.80	Mar. 12
Prince of Wales	"	James R. Cranston	1625 G. 1	51.09	April 9
Shanrock	"	James H. O'Donnell	16405 G. 1	11.25	Mar. 13
Snow Storm	"	William Waddie	10018 G. 1	46.03	April 4
Spud Fractional	"	Achille Israel Marentelle, Eugene Wilson Stoner	8987 G. 1	42.60	April 13
Summit	"	"	8985 G. 1	51.17	April 13
Trilby	"	Wm. E. Costello	1626 G. 1	47.76	April 9
Boone Fractional	Ainsworth	Phil Corrigan	10662 G. 1	40.93	May 14
Cannon Ball	"	Frank Bailey	1512 S.	51.47	Aug. 15
Deer Lodge	"	Wm. Lee McLaughlin	1036 G. 1	51.65	May 16
Kaslo Fractional	"	"	1040 G. 1	1.93	April 9
Mountain View	"	John Wesley Power	10445 G. 1	42.2	April 4
Nap Fractional	"	Highlander Milling and Mining Co.	5266A G. 1	2.39	Sept. 23
North Star Fractional	"	John Wesley Power	10444 G. 1	37.2	April 4
Patrieks	"	Wm. Edwards Holder	5189 G. 1	51.65	July 10
Pearl Fractional	"	D. F. Strobeck	8263 G. 1	2.02	June 24
Romanes Fractional	"	David P. Hatch, Warren E. Lloyd, Frances J. Nellis	5530 G. 1	16.33	Aug. 15
Silver King	"	Wm. Lee McLaughlin	1031 G. 1	23.9	April 9
Tamarac	"	Scott Thornburg	7140 G. 1	51.65	Feb. 13
Bright Light	Sloean City	Donald Duncan McPherson, Andrew Jacobsen, Bertha Angrignon, John Thomas Black, Mary Hicks, Alex. Mackie Rogers, Duncan James Weir	9845 G. 1	23.31	Feb. 20
Champion No. 2	"	Daniel A. MacLachlan	10811 G. 1	44.30	Sept. 4
" No. 2 Frac	"	"	10812 G. 1	12.73	Sept. 4

WEST KOOTENAY.—*Concluded.*

Claim.	Division.	Grantee.	Lot No.	Acres.	Date.
Christina.....	Slocan City.....	Michael Murphy, Patrick Henry Cosgrove.....	1059 G. 1	49.69	Jan. 4
Cub Fractional.....	".....	Donald Duncan McPherson, Andrew Jacobsen, Bertha Angrignon, John Thomas Black, Mary Hicks, Alexander Mackie Rogers, Duncan James Weir.....	9846 G. 1	17.24	Feb. 20
Missing Link.....	".....	Donald Duncan McPherson, Andrew Jacobsen, Duncan James Weir, Bertha Angrignon, John Thomas Black, Duncan Grant.....	9844 G. 1	48.77	Feb. 20
Sapphire No. 2.....	".....	Daniel A. MacLachlan.....	10813 G. 1	15.45	Sept. 4
" No. 2 Frac.....	".....	".....	10814 G. 1	4.99	Sept. 4
Virgel.....	".....	Michael Murphy, Patrick Henry Cosgrove.....	10595 G. 1	51.65	Jan. 4
Young Bear.....	".....	Donald Duncan McPherson, Andrew Jacobsen, Bertha Angrignon, John Thomas Black, Mary Hicks, Alexander Mackie Rogers, Duncan James Weir.....	9843 G. 1	50.74	Feb. 20
American.....	Slocan.....	John S. Bedier.....	5851 G. 1	34.00	April 29
Kakana.....	".....	Hugh J. P. Buckley.....	9184 G. 1	31.97	Sept. 4
Kaslo.....	".....	Wm. Lee McLaughlin.....	1054 R. 1	26.68	July 10
Liberal.....	".....	John S. Bedier.....	2271 G. 1	39.80	April 29
Miller Creek Fractional.....	".....	Gus Faudrey.....	5191 G. 1	38.09	July 16
War Eagle.....	".....	Consolidated Mining & Smelting Company of Canada, Ltd., The Ohio Mines Development Co., Ltd. (S.P.L.).....	2323 G. 1	44.48	Sept. 18
Broadview Fractional.....	Trout Lake.....	The Ohio Mines Development Co., Ltd. (S.P.L.).....	6019 G. 1	26.58	May 15
Coronation.....	".....	Cutler Thomas Porter.....	7861 G. 1	45.83	April 19
Glad Hand.....	".....	Wm. Pennett, Bruce White, Nettie Davey.....	8681 G. 1	43.06	July 20
Indiana.....	".....	The Ohio Mines Development Co., Ltd. (S.P.L.).....	6017 G. 1	32.85	May 15
L.H.....	".....	".....	6018 G. 1	10.81	May 15
Abe Lincoln No. 1.....	Trail Creek.....	Consolidated Mining & Smelting Co. of Canada, Ltd.....	1296 G. 1	18.17	Sept. 18
Deer Park.....	".....	".....	932 G. 1	51.65	Sept. 19
Grand Prize.....	".....	".....	933 G. 1	44.39	Sept. 19
Josie Mac.....	".....	Chas. R. Hamilton, Edmund C. Wragge.....	1230 G. 1	35.80	Sept. 19
Last Chance.....	".....	".....	3027	17.96	Nov. 19
Tuesday.....	".....	".....	1278 G. 1	32.27	Sept. 19
White Iron.....	".....	Samuel W. Forteach.....	4664 G. 1	20.70	July 4
Virginian.....	Arrow Lake.....	Theodore Nels Okerstrom, Lyland Franklin McDougald.....	1693 G. 1	30.54	April 29

BOUNDARY.

Alert.....	Grand Forks.....	Forbes Murray Kerby.....	936 S.	50.60	Mar. 13
Alto Fractional.....	".....	".....	926 S.	16.98	Mar. 13
Antelope Fractional.....	".....	".....	928 S.	21.66	Mar. 13
Athelstan.....	".....	Wm. J. Prendergast, John S. Boyce, Chris. H. Reeves.....	1325 S.	39.75	Sept. 23
Big Cub.....	".....	Herbert C. Kerman, Maggie M. Kerman, David Shannon.....	1334 S.	45.85	Mar. 2
Black Bear.....	".....	".....	1735 S.	32.27	Mar. 2
Eclipse.....	".....	Forbes Murray Kerby, Bernard Lequime.....	925 S.	51.65	Mar. 13
Eganville.....	".....	Wm. J. Prendergast, John S. Boyce, Chris. H. Reeves.....	1016 S.	23.97	Sept. 23
June.....	".....	Angelo Luciani, Luigi Gri, Antonio Copicetti.....	1464 S.	51.02	June 8
Little Cub Fractional.....	".....	Herbert C. Kerman, Maggie M. Kerman, David Shannon.....	1333 S.	51.09	Mar. 2
Loek Port.....	".....	Isaac Hoyt Hallett, James F. Cunningham.....	591 S.	43.44	June 8
Original.....	".....	Alexander E. Barr, Charles E. Baker.....	1327 S.	51.65	April 4
Ready Cash Fractional.....	".....	George Cook, Mary Turner McMynn, Louise Albert Smith, Joseph Ernest McEwan.....	1260 S.	51.65	Sept. 4
R. Kipling Fraction.....	".....	George Cook, Mary Turner McMynn.....	1259 S.	31.23	Sept. 4
Snowshoe Fractional.....	".....	John Mulligan.....	3062 S.	1.9	May 14
St. Joseph.....	".....	Henry Johnson, Peter Edward Blakie.....	2919	32.01	Mar. 23
Transit Fractional.....	".....	B.C. Copper Co., Ltd.....	1470 S.	1.91	Nov. 1
Twin Mine.....	".....	Andrew Hamilton, John James Cheas, administrator of the estate of Thomas Kerncen, deceased, intestate.....	1426 S.	48.2	Feb. 8
Wave Fraction.....	".....	Thomas B. Richards.....	1154 S.	40.75	Nov. 12
Yellow Jacket.....	".....	Forbes Murray Kerby, Bernard Lequime.....	924 S.	27.56	Mar. 13
Atlantic Fractional.....	Greenwood.....	Gustave Johnson.....	782 S.	50.27	Dec. 16
Atlantic Fractional No. 2.....	".....	".....	783 S.	7.10	Dec. 16
Atlas.....	".....	Josiah Graham.....	664 G. 1	50.88	Sept. 18
Belleview Fractional.....	".....	Eric E. Jackson, Francis W. Groves.....	564 S.	9.46	Sept. 5
Copper Queen.....	".....	Norman Morrison.....	1563 S.	51.65	June 20
Diamond Joe Fractional.....	".....	Wellington Elson, Jane Russel, Evan Barry.....	993 S.	40.0	April 6
Funny H. Fractional.....	".....	No. 7 Mining Co., Ltd.....	1643 G. 1	13.61	Aug. 14
Great Laxey.....	".....	Andrew Hamilton, John James Cheas, administrator of the estate of Thomas Kerncen, deceased, intestate.....	1425 S.	45.19	Feb. 8
Lady of the Lake.....	".....	No. 7 Mining Co., Ltd.....	1642 G. 1	51.36	Aug. 15
Lily.....	".....	John O. Thompson, Wm. D. Morton.....	1565 S.	47.50	Sept. 5
Monte Christo.....	".....	Sydney M. Johnson, Mark W. Smith, Philip B. S. Stanhope, Philip B. S. Stanhope, Richard T. Nicholson.....	3125 S.	33.5	Jan. 18
Ohio.....	".....	Philip B. S. Stanhope, Richard T. Nicholson.....	3124 G. 1	44.51	Nov. 20
St. Lawrence.....	".....	Norman Morrison.....	1562 S.	45.97	June 20
Smilax Fractional.....	".....	Isaac Hoyt Hallett, Albert Easheroft.....	1064	38.50	June 17
Acacia.....	Osoyoos.....	Jennie Louise Wilby.....	694 S.	43.35	Feb. 19
Acadia.....	".....	".....	685 S.	51.65	Feb. 19
Alpha.....	".....	".....	691 S.	51.65	Feb. 19
Australian.....	".....	".....	690 S.	51.65	Feb. 19
Craeker Jack.....	".....	Frank Bailey, Walter E. Hodges, Fred. W. Gladden, John Gladden, James N. Paton.....	708	42.69	July 19
July Fractional.....	".....	Hedley Gold Mining Co.....	1581 S.	1.06	Aug. 32
New York Fractional.....	".....	".....	1582 S.	29.24	July 24
Sacramento.....	".....	Adam Creelman.....	2673	39.9	Mar. 23
Utopia.....	".....	Jennie Louise Wilby.....	692 S.	43.36	Feb. 19
Wellington.....	".....	Frank Bailey, Walter E. Hodges, Frederick W. Gladden, John Gladden, James N. Paton.....	707	27.49	July 19

BOUNDARY.—*Concluded.*

Claim.	Division.	Grantee.	Lot No.	Acres.	Date.
Boyne	Kamloops	Bertram F. Lundy	2107 G. 1	32.1	Feb. 21
Cotton Belt	"	"	2105 G. 1	28.2	Feb. 20
Evening Star	"	John Hudson Morrison, Alex. S. McArthur, James Milne Harper	1013 G. 1	51.65	April 2
Harison	"	Bertram F. Lundy, Thomas Ellis	2108 G. 1	33.1	Feb. 21
Iron Cap	"	Frederick A. McLeod, Wm. J. Harvey, Spencer Llewellyn Bulkeley	875 G. 1	49.55	July 31
Jessie	"	Alex. Joseph McMullen, James Herdman	2110 G. 1	40.5	Feb. 21
Joe	"	Bertram F. Lundy, Fred. Temple Cornwall, official adminis- trator of the estate of John Nidea, deceased, intestate	2106 G. 1	26.8	Feb. 20
Victoria	"	Bertram F. Lundy, Caroline V. Daniels	2109 G. 1	30.9	May 18
Wellington	"	Robert Kieby	2111 G. 1	51.4	Mar. 5
British Queen	Yale	Mt. Baker and Yale Mining Co.	431 G. 1	19.12	Mar. 15
Captain Jack	"	"	432 G. 1	20.34	Mar. 15
Grimmer	"	"	434 G. 1	31.0	Mar. 15
Homestake	"	Oliver Redpath, James Manson, Thomas Bulman	2125 G. 1	51.65	July 25
Hunter Fractional	"	Clarence A. Kline	435 G. 1	6.75	Mar. 16
Little Gold Bug Fraction	"	Mt. Baker and Yale Mining Co.	430 G. 1	11.41	Mar. 15
Lou Isabella	"	"	433 G. 1	18.76	Mar. 15
Old Puss	"	"	429 G. 1	13.94	Mar. 15
Ora	"	"	436 G. 1	51.65	Mar. 15
Wheat Tamer	"	Owen Salisbury Batchelor	2126 G. 1	51.65	July 25
Aggratite	Nicola	Robert Henderson	1259 G. 1	40.3	Sept. 7
Bauxite	"	"	1267 G. 1	51.56	Sept. 7
Gipsy	"	"	1258 G. 1	48.47	Sept. 7
Night Hawk	"	Wm. Murray	1519 G. 1	17.3	Sept. 5
Tom Cat	"	"	1517 G. 1	51.48	Sept. 5
Bell Fractional	Similkameen	Francis W. Groves, Eric E. Jackson	420A G. 1	6.56	Jan. 19
Columbia Fractional	"	Robert Barrie, Albert Howard MacNeill	135 G. 1	7.14	April 29
Freddie B	"	Luke Gibson	1521 G. 1	51.65	April 29
Puritan	"	Ellen J. Barron	807 S.	51.65	May 14
Rambler	"	Luke Gibson	1522 G. 1	49.38	April 29

VANCOUVER ISLAND AND COAST.

Bear	N. Westminster	Britannia Mining and Smelting Co., Ltd.	2318 G. 1	46.28	Sept. 15
Deer	"	"	2400 G. 1	51.65	Aug. 15
Elk	"	"	2399 G. 1	46.20	Aug. 15
Lynx	"	"	2335 G. 1	45.73	Sept. 5
Park	"	"	2078 G. 1	50.23	Aug. 15
Park Lane	"	"	2060 G. 1	51.65	Aug. 15
Vancouver	"	Bowen Island Copper Co., Ltd. (N.P.L.)	3367 G. 1	29.92	July 10
Victoria	"	"	3368 G. 1	51.6	June 17
Banker	Nanaimo	Fairfield Exploration Syndicate, Limited	291 R. 1	41.77	Jan. 18
Canada No. 28	"	Tacoma Steel Co.	317	30.2	May 31
" No. 29 Frac.	"	"	318	6.4	May 31
" No. 30	"	"	320	49.80	May 31
" No. 31	"	"	319	23.3	May 31
" No. 32	"	"	321	50.70	May 31
" No. 33	"	"	322	41.4	May 31
" No. 34	"	"	324	51.65	May 31
" No. 35	"	"	323	49.50	May 31
Chimnang	"	Fairfield Exploration Syndicate, Limited	319 R. 1	51.23	Jan. 18
Comox Fractional	"	"	297 R. 1	19.85	Jan. 18
Doratha Morton	"	"	253 R. 1	51.65	Jan. 19
" Frac.	"	"	300 R. 1	23.3	Jan. 19
Douglas	"	"	320 R. 1	48.74	Jan. 18
Eva	"	"	254	42.14	Jan. 18
Lucky Jim	"	Alexander McNair	723	51.65	May 15
Maggie May	"	Fairfield Exploration Syndicate, Limited	322 R. 1	24.0	Jan. 18
" Percy"	"	"	299 R. 1	49.52	Jan. 18
Rising Sun	"	Alexander McNair	722	51.54	May 15
Saxon	"	"	721	43.29	May 23
Black Bear	Alberni	Arthur E. Waterhouse	109	51.65	Nov. 12
Edith	"	"	108	51.65	Nov. 12
A. T. Monteith	Quatsino	Andrew Tait Monteith, John L. Hangi, Joseph Hunter	826	51.65	July 19
Little Jap	Vancouver	Britannia Mining and Smelting Co., Ltd.	2094 G. 1	39.17	Dec. 20
Uncle Sam	"	Albert E. Stevens, Robert Thompson	2324 G. 1	48.12	April 19
Utopia	"	Britannia Mining and Smelting Co., Ltd.	1635B G. 1	41.72	Dec. 20
Meryl	Victoria	Wm. A. Lorimer	Sect. 90	51.55	Sept. 13

DEPARTMENT OF MINES.

VICTORIA, B.C.

HON. SIR RICHARD MCBRIDE,	-	-	-	-	<i>Minister of Mines.</i>
R. F. TOLMIE,	-	-	-	-	<i>Deputy Minister of Mines.</i>
WM. FLEET ROBERTSON,	-	-	-	-	<i>Provincial Mineralogist.</i>
D. E. WHITTAKER,	-	-	-	-	<i>Assistant Assayer.</i>
THOMAS GRAHAM,	-	-	-	-	<i>Chief Inspector of Mines, Victoria.</i>
HENRY DEVLIN,	-	-	-	-	<i>District " Nanaimo.</i>
JOHN NEWTON,	-	-	-	-	" "
EVAN EVANS,	-	-	-	-	" <i>Fernie.</i>
THOMAS H. WILLIAMS	-	-	-	-	" "
ROBERT STRACHAN,	-	-	-	-	" <i>Merritt.</i>
JAMES MCGREGOR,	-	-	-	-	" <i>Nelson.</i>

GOLD COMMISSIONERS AND MINING RECORDERS.

Mining Divisions.	Location of Office.	Gold Commissioner.	Mining Recorder.	Sub-Recorder.
Atlin Mining Division..	Atlin	J. A. Fraser	W. G. Paxton....	
Sub-office	Discovery City			R. Webster.
"	Telegraph Creek			John Cartmel.
"	Summit Station			Geoffrey Butler.
"	Wynnton			W. H. Simpson.
"	Haines (U.S.)		(Com. for taking	Risdon M. Odell.
"	Nahlin		Atlinavits)	J. F. Pilling.
Stikine Mining Division ..	Telegraph Creek ..	John Cartmel.....	John Cartmel.....	
Sub-office	Boundary			William Strong.
Liard Mining Division ..	Telegraph Creek ..	John Cartmel.....	John Cartmel.....	
Sub-office	Porter's Landing ..			Chas. H. Smith.
"	McDame Creek			Amos Everson.
Skeena Mining Division ..	Prince Rupert....	J. H. McMullin... .	J. H. McMullin	
Sub-office	Kitimat			Geo. L. Anderson.
"	Port Simpson			J. R. C. Deane.
"	Essington			A. Forsythe.
"	Stewart (Portland Canal)			John Conway.
"	Unk River.....			Burt E. Daily.
"	Hartley Bay.....			
"	Goose Bay			F. A. McKinnon.
Portland Canal M.D.	Stewart.....	J. H. McMullin ..	John Conway.....	
		(at Prince Rupert)		
Bella Coola Mining Div. . .	Prince Rupert....	J. H. McMullin... .	J. H. McMullin . .	
Sub-office	Bella Coola			Frank Broughton.
Queen Charlotte Min'g D.	Queen Char. City.	E. M. Sandilands..	E. M. Sandilands..	Petrie S. Jack.
Sub-office	Jedway			W. Prescott.
"	Masset			C. Harrison.
"	Lockeport			H. L. Beresford.
Omineca Mining Division.	Hazelton	Stephen H. Hoskins	Jas. E. Kirby	
Sub-office				
"	Fort Grahame			Wm. Fox.
"	Fort St. James			Alex. C. Murray.
"	Manson Creek			W. B. Steele.
"	Copper City			P. R. Skinner.
"	Aldermere			R. Gale.
"	Lorne Creek			F. E. Holt
"	Terrace			T. W. S. Parsons.
"	Fort St. John			F. W. Beaton.
"	Babine Portage ..			R. J. Cameron.
"	Fort Fraser			J. E. Hooson.

GOLD COMMISSIONERS AND MINING RECORDERS.—*Continued.*

Mining Divisions.	Location of Office.	Gold Commissioner.	Mining Recorder.	Sub-Recorder.
Peace River Mining Div.	Fort St. John		F. W. Beaton	
Cariboo Mining Division	Parkerville	C. W. Grain	R. S. C. Randall	
Sub-office	Quesnel			A. P. Halley.
"	Fort George			T. W. Herne.
"	17-Mile Post (G.T.P.)			Stanley Beyts.
Quesnel Mining Division	150-Mile House	C. W. Grain	E. C. Lunn	
Sub-office	Quesnel	(at Barkerville)		A. P. Halley.
Clinton Mining Division	Clinton	F. C. Campbell		
Lillooet	Lillooet	Caspar Phair	Caspar Phair	
Kamloops Mining Division	Kamloops	E. T. W. Pearse	E. Fisher	
Ashcroft	Ashcroft	" (at Kamloops)	H. P. Christie	
Nicola	Nicola	" "	W. N. Rolfe	
Yale	Yale	" "	L. A. Dodd	
Sub-Office	Hope	" "		Ewen McLeod.
Similkameen	Princeton	Hugh Hunter	Hugh Hunter	
Sub-office	Hedley			F. M. Gillespie.
Vernon Mining Division	Vernon	L. Norris	H. F. Wilmot	
Greenwood Mining Div.	Greenwood	W. R. Dewdney		
Sub-office	Vernon			H. F. Wilmot.
"	Rock Creek			H. Nicholson
"	Beaverdell			E. F. Ketchum.
Grand Forks Min. Div.	Grand Forks	S. R. Almond	S. R. Almond	
Osoyoos Mining Division	Fairview	J. R. Brown	Ronald Hewat	
Sub-office	Olalla			R. W. Northey.
"	Hedley			F. M. Gillespie.
Golden Mining Division	Golden	H. C. Rayson	F. H. Bacon	
Windermere	Wilmer		G. F. Stalker	
Fort Steele Mining Div.	Cranbrook	Alfred C. Nelson	N. A. Wallenger	
Sub-office	Steele			Joseph Walsh.
"	Fernie			J. S. T. Alexander.
"	Moyie			John P. Farrell.
"	Marysville			G. W. Mowatt.
Ainsworth Mining Div.	Kaslo	R. J. Stenson	A. McQueen	Wm. J. Green.
Sub-office	Howser			W. Simpson.
"	Trout Lake			F. Mummery.
Slocan Mining Division	New Denver	R. J. Stenson (at	Angus McInnes	
Sub-office	Sandon	" Kaslo)		W. J. Parham.
Slocan City Mining Div.	Slocan City		Howard Parker	
Trout Lake Mining Div.	Trout Lake	R. J. Stenson	F. Mummery	
Nelson Mining Division	Nelson	W. F. Teetzel	S. S. Jarvis	
Sub-office	Creston			Guy Loewenberg.
"	Ymir			Geo. S. Coleman
"	Sheep Creek		James Thompson	
Arrow Lake Min. Division	Nakusp	W. F. Teetzel (at	Walter Scott	
Sub-office	Vernon	Nelson)		H. F. Wilmot.
Revelstoke Mining Div.	Revelstoke	Robt. Gordon	W. E. McLaughlin	Newton R. Brown
Lardeau Mining Division	Beaton	" (at Revelstoke)	William A. Strutt	
Trail Creek Mining Div.	Rossland	H. R. Townsend	H. R. Townsend	

GOLD COMMISSIONERS AND MINING RECORDERS.—*Concluded.*

Mining Division.	Location of Office.	Gold Commissioner.	Mining Recorder.	Sub-Recorder.
Nanaimo Mining Division	Nanaimo	George Thomson...	George Thomson...	
Sub-office	Ladysmith			John Stewart.
"	Alert Bay			H. F. Helmsing.
"	Vananda			David Jones.
"	Rock Bay			W. H. Lines.
Alberni Mining Division..	Alberni	J. Kirkup		
Clayoquot "	Clayoquot	" (at Alberni)	W. T. Dawley	
Quatsino "	Quatsino	"	O. A. Sherberg.....	
Victoria Mining Division..	Victoria	Herbert Stanton...	Herbert Stanton...	
New Westminster Min. D.	New Westminster.	S. A. Fletcher.....	I. Wintemute.....	
Sub-office	Harrison Lake			L. A. Agassiz.
"	Chilliwack			J. Pelly.
Vancouver Mining Div...	Vancouver	John Mahony	A. P. Grant	

TABLE OF CONTENTS.

Subject.	Submitted by.	Page.
Mineral Production.....	Provincial Mineralogist	7
Statistical Tables.....	" "	7 to 15
Progress of Mining during Year.....	" "	16
Statistical Tables—Digest of.....	" "	17
Bureau of Mines—Work of Year.....	" "	29
Assay Office Report.....	" Assayer	30
Examination for Assayers.....	" "	31
List of Licensed Assayers.....	" "	32
Examination of Coal-mine Officials.....	" Mineralogist	33
Board of Examiners—Report of Secretary.....	Tully Boyce, Secretary.....	34
List of Licensed Coal-mine Officials	Provineial Mineralogist.....	38
Cariboo District.....	.....	49
Cariboo Mining Division—Report on.....	Gold Commissioner	49
" " " Notes on Mica Claims.....	Provincial Assayer.....	52
Quesnel Mining Division—Report on.....	Mining Recorder.....	53
Cassiar District—Report on Atlin Mining Division.....	Gold Commissioner	55
Stikine and Liard Mining Divisions—Report on.....	" "	63
Trip to Dease Lake and the Groundhog Coalfield.....	Provineial Mineralogist	65
Other Reports on the Groundhog Coalfield.....	" "	94
Skeena District—Report on.....	Gold Commissioner	99
Skeena and Bella Coola Mining Divisions—Report on.....	" "	99
Skeena Mining Division—Notes on Claims on Princess Royal Island.....	Provineial Assayer.....	100
Portland Canal Mining Division—Report on.....	Mining Recorder	103
Queen Charlotte Mining Division	Gold Commissioner	109
Omineca Mining Division	" "	111
" " " Notes on.....	Provineial Mineralogist	116
Peace River Mining Division—Notes on.....	" "	117
" " " Report on Coal-measures of Peace River Canyon.....	C. F. J. Galloway, B.Sc.....	118
South-East Kootenay District.....	.....	137
Fort Steele Mining Division.....	Gold Commissioner	137
North-East Kootenay District.....	.....	139
Golden Mining Division.....	Provineial Mineralogist.....	139
Windermere Mining Division	Mining Recorder.....	141
North-West Kootenay District.....	Gold Commissioner	142
Revelstoke Mining Division.....	Mining Recorder.....	142
" " " Notes on Big Bend.....	J. A. Watson.....	143
Lardeau Mining Division.....	Mining Recorder.....	145
Sloean District.....	Gold Commissioner	146
Ainsworth Mining Division.....	" "	146
Sloean	Mining Recorder	148
Sloean City	" "	150
Trout Lake	" "	151
Nelson District.....	.....	152
Nelson Mining Division.....	Gold Commissioner	152
" " " Notes on Reported Discovery of Platinum.....	Provineial Mineralogist.....	156
Arrow Lake Mining Division	Mining Recorder.....	160
Rossland District.....	.....	161
Trail Creek Mining Division.....	Gold Commissioner	161
Boundary District—Greenwood Mining Div.—Notes on.....	Provineial Mineralogist.....	163
Greenwood Mining Division.....	Gold Commissioner	167
Grand Forks Mining Division—Notes on.....	Provineial Mineralogist.....	168
" " " Report on.....	Gold Commisssiener.....	174
Osoyoos	" "	178
Vernon	" "	183
Yale District.....	.....	184
Kamloops Mining Division—Report on.....	Gold Commissioner	184
Ashcroft	Mining Reeorder	185
Yale	" "	186
Nicola	" "	188
Similkameen	Provineial Mineralogist.....	189
" " " Notes on	" "	189
" " " Report on.....	Mining Recorder	190

TABLE OF CONTENTS—*Concluded.*

Subject.	Submitted by.	Page.
Lillooet District.....		191
Lillooet Mining Division.....	Gold Commissioner.....	191
Clinton " ".....	" ".....	192
Vancouver Island and Coast Districts.....		193
Alberni Mining Division.....	Gold Commissioner.....	193
Clayoquot Mining Division.....	Mining Recorder.....	193
" " " Notes on.....	Provincial Assayer.....	195
Quatsino " " Report on.....	Mining Recorder.....	196
Nanaimo " " " ".....	Gold Commissioner.....	197
Victoria " " " ".....	" ".....	198
New Westminster Mining Division.....	Mining Recorder.....	199
Vancouver Mining Division.....	" ".....	200
Inspection of Mines:		
Report of Chief Inspector.....		204
Diamond Vale Colliery Explosion—Report on.....	Provincial Mineralogist.....	216
" " " " ".....	Chief Inspector.....	224
Inspection of Metalliferous Mines:		
West Kootenay and Boundary Districts.....	Inspector of Districts.....	235
East Kootenay District.....	" District.....	237
Coast District.....	" ".....	238
List of Accidents in Metalliferous Mines.....	Provincial Mineralogist.....	240
" " " " Tabulated.....	" ".....	241
Coal-mining in British Columbia.....	" ".....	242
Collieries producing.....	" ".....	244
" of the Coast Inspection District.....	" ".....	245
" " East Kootenay Inspection District.....	" ".....	248
Coal Potentialities of British Columbia.....	" ".....	249
Inspection of Coal Mines:		
Vancouver Island Coast Inspection District.....	Inspectors of Districts.....	251
East Kootenay Inspection District.....	" ".....	294
Accidents in British Columbia Collieries, 1903-1912.....	Provincial Mineralogist.....	310
" " " " 1912.....	" ".....	311
Detailed Statement of Accidents, Coast District.....	Inspector of District.....	313
" " " " East Kootenay Dist.....	" ".....	316
Prosecutions under "Coal-mines Regulation Act".....	Provincial Mineralogist.....	320
Shipping Mines—List of.....	" ".....	322
Crown-granted Mineral Claims, 1912.....	" ".....	324
Gold Commissioners and Mining Recorders—List of.....	" ".....	328
Table of Contents.....	" ".....	331
Index.....	" ".....	333
List of Illustrations.....	" ".....	349
Library Catalogue Slips.....	" ".....	351

INDEX.

A.

PAGE.		PAGE.
	<i>A.A.</i>	107
	Abraham creek	89
	Accidents in coal-mines	204
	Causes, percentages of, total	205
	In anthracite mines, paper on	210
	Reference to	205
	Accidents in metalliferous mines	240
	Detailed list of	208
	Causes of	241
	Agriculture, Iskut river	83
	Klappan river	83
	Stikine river	67, 72
	AINSWORTH MINING DIVISION:	
	Reference to silver output	24
	Report of Gold Commissioner	146
	Report of Inspector	236
	<i>Ajoe</i>	151
	<i>Alabama</i>	50
	<i>Alamo</i>	149
	Alberni canal, coal and copper on	193
	ALBERNI DISTRICT	193
	ALBERNI MINING DIVISION:	
	Report of Gold Commissioner	193
	Iron-ore	193
	Alberta, reference to anthracite coal of	96
	Albert head, quarries at	199
	Alder Creek (U.S.A.) Dredging Co.	51
	Alice arm	99
	<i>Amargosa</i>	114
	<i>American Boy</i>	111, 112
	American creek	109
	Analyses of Groundhog coal	95
	Dust at Diamond Vale	229
	<i>Ananrus</i>	115
	Anderson river	188
	Andesite	27
	<i>Annie</i>	161
	<i>Annie Fraction</i>	161
	<i>Annie M.</i>	144
	Anthracite coal (<i>see</i> Coal).	
	Anthracite creek, coal from	95
	Anyox	173
	<i>Aper</i> (Osoyoos)	182
	" (Queen Charlotte)	110
	" (Slocan)	150
	<i>Archibald</i>	194
	<i>Argo</i>	167
	<i>Arlington</i>	155
	ARROW LAKE MINING DIVISION:	
	Report of Mining Recorder	160
	Ashcroft	118, 185
	ASHCROFT MINING DIVISION:	
	Report of Gold Commissioner	185
	" Ashcroft trail "	83, 94
	Ashnola creek, placer on	183
	<i>Aspen</i>	155
	Assay Office, work of year	30
	Assayers, list of	32
	Assayers' examinations	29, 30
	Reference to	31
	Athabaska Landing	125
	<i>Athelstan</i>	163
	Atlin (town)	61
	Reported gold strike	60
	Minor reference to	64
	Driest season on record	58
	Atlin Consolidated Mining Co.	55, 56
	ATLIN MINING DIVISION:	
	Report of Gold Commissioner	55
	Gold production	23
	<i>A. T. Montcith</i>	196
	Aufaes Gold Mines, Ltd.	187
	<i>Aurora</i>	137

B.

Babine range	115	Berry creek (Liard)	77, 78
Bald mountain	160	Berry Creek Mining Co. (now Boulder Creek Mining Co.)	77
Balsam creek	115	Beven (town)	274
Barkley sound	193	Biernes creek	86, 92, 97
Barr creek	53	Big Bend district	142
Basalts of Stikine river	72, 81	Report by J. A. Watson	143
Bear lake (Princess Royal island)	100	<i>Big Galena</i>	54
" (Slocan)	146	<i>Big Horn</i>	180
<i>Bear River</i> (Portland Canal)	107	<i>Big Interior</i>	193
" (Clayoquot)	194	<i>Big Ledge</i>	160
Bear river	104	<i>Big Missouri</i>	106
Portland Canal	106	<i>Bimetallic</i>	154
Placer leases	107	Birch creek	58
Clayoquot	193	Bitter creek	109
Beasley	152	Placer gold	104
Bedwell sound	193	Bituminous coal (<i>see</i> Coal).	
BELLA COOLA MINING DIVISION	99	<i>Black Bear</i>	161
<i>Ben McCreec</i>	60, 61	Black point	192
Berry creek (Atlin)	63		

	PAGE.		PAGE.
<i>Black Prince</i>	150	<i>Britannia</i>	201
"Black rock"	69	Report of Inspector.....	238
Black sand, platinum in (Thibert creek) ..	63	Britannia Beach.....	200
(Kamloops)	184	Britannia Mining and Smelting Co.....	200
Blubber bay	28	<i>B.C.</i> quartz-mine.....	51
<i>Blucbell</i>	147	<i>B.C.</i> Amalgamated Anthracite Coal Co.....	93
<i>Blue Bird</i> (Quatsino)	196	Report by G. W. Evans	95
" (Trail creek)	161	<i>B.C.</i> Anthracite Coal, Ltd.	89, 91, 116
Blue canyon	57	<i>B.C.</i> Anthracite Syndicate.....	116
<i>Bluff</i>	100	<i>B.C.</i> Anthracite Coal Syndicate.....	86, 93
Blume creek, coal from.....	95	<i>B.C.</i> Copper Co.....	152, 163, 189, 190, 236
Board of Examiners.....	34	<i>B.C.</i> Electric Co., plant at Goldstream.....	198
Boat harbour.....	265	<i>B.X.</i> (British Columbia Express) Transpor- tation Co.	118
<i>Bonanza</i>	109	British Columbia Pottery Co.....	27, 199
Boston bar.....	186	Shale from Kyuquot.....	196
Boulder creek (Atlin).....	58	British Pacific Coal Co., Ltd.....	249
" (Thibert creek)	78	Distribution of output.....	278
Boulder Creek Mining Co. (Atlin).....	63	<i>Broadview</i>	151
" (Liard).....	77	<i>Buckhorn</i>	115
"Boundary" on Stikine river.....	66	Buck's Bar	69
Boundary District, gold production of	23	Building materials, production of.....	18, 27
Copper production	25	Building-stone, production of.....	27
Statistics	18	Bulkeley lake (<i>see</i> Destline lake).	
Provincial Mineralogist, notes by.....	163	Bull's head mountain.....	123, 127
Inspector's report.....	236	Burdette creek.....	60
Boundary Mining and Exploration Co.....	168	Bureau of Mines.....	29
Brewer creek.....	91	Burrard inlet.....	200
Brick	9	Burton	160
Red	27, 199	<i>Butte Frac</i>	161
Sidney island.....	199	Butte-Rocher Déboulé Copper Co.....	114
Lime silica.....	199		
Bridge river.....	191		

C.

Cache Creek group of rocks, reference to ..	72	Canadian Pacific Railway— <i>Concluded</i> .	
Cadman-Cunninghame gas-detector	280	Minor reference to	52
Calgary, reference to.....	53	Phoenix	176
California, oil from.....	24	Nicola coal used.....	189
Camborne	142	Main line.....	185, 217
Campbell-Johnston camp.....	86	Canadium, reported new metal	158
Campbell River, coal development.....	250	Canoe river, reference to source of.....	52
Camp Hedley.....	178	<i>Cap Sheaf</i>	197
Camp Robertson.....	249	Carbonado Colliery	207
Camp Wilson	111, 249	Cariboo, dredging and lode-mining in	51
Canada Gold Dredging Co., Ltd.....	192	Caribon camp, Dease Lake trail.....	75
Canadian-Alaska Exploration Co.....	59	CARIBOO DISTRICT.....	49
<i>Canadian Boy</i>	151	Report of Gold Commissioner.....	49
Canadian Collieries, Ltd., labour troubles.....	20	Coal in	249
Clay used for tiles.....	27	Cariboo lake, lode mines.....	54
Output for year.....	260	CARIBOO MINING DIVISION:	
Output "Extension"	261, 263	Notes on mica in, by H. Carmichael.....	52
Comox	271	Gold, placer, production.....	23
Report of Inspector.....	271	Report of Gold Commissioner.....	49
Development-work	250	Carmichael, Herbert, retirement of, as Pro- vincial assayer.....	30
Canadian Geological Survey, report on Skagit river	187	Assays of Nelson platinum.....	159
<i>Canadian King</i>	112	Notes on Tete Jaune Cache mica.....	52
Canadian Marble and Granite Co.	27	Peace River coal analysed.....	134
Canadian Mining Operators.....	116	Notes on Clayoquot Mining Division.....	195
Canadian Mining Institute, paper read to, by G. W. Evans on Groundhog coal.....	95	Report on Princess Royal island.....	100
Meeting in Vancouver.....	29	Carnes creek.....	144
Canadian Northern Ry. Co.....	125	<i>Cascade</i>	115
With reference to Cariboo mica claims.....	53	Cascade creek (Portland Canal).....	105
Yale	188	" (Ainsworth)	147
Canadian Pacific Railway, Sandon branch..	146	Cascade Falls Mining Co.....	104, 106
Kootenay Central.....	139	Cassiar Central Railway.....	68, 81
Crowsnest branch, reference to	139	Cassiar goldfields, old route to.....	83
Steamer	29	Cassiar Hydraulic Mining Co., Ltd.....	115

PAGE.	PAGE.
CASSIAR MINING DIVISION:	Coal— <i>Concluded</i> .
Copper production.....	Zymoetz river..... 115, 249
Report of placer gold.....	Alberni..... 193
Report of Gold Commissioner.....	Peace River Mining Division..... 117
Gold rush to.....	Report by Galloway..... 118
Gold-mines.....	Groundhog..... 92, 98, 116
Early reports.....	Analyses of Groundhog..... 95, 98
Gold production.....	Labour agreements made in East Kootenay..... 22
Chinese miners.....	Output of Coast District..... 21
C.B.....	Statistics..... 20
Cedar creek.....	Prices of coal and coke..... 19, 244
Cement, Tod inlet, Princeton, Saanich arm,	Anthracite..... 98
Prince Rupert.....	Pick-mining of..... 303
Production of.....	Coalfields, prospective..... 249
Vancouver Island.....	Bulkley valley..... 249
<i>Centre Star</i>	Telkwa valley..... 249
Chestnut Hill Mining Co.....	Graham island..... 249
Chief Inspector of mines, report of.....	Bear lake, Cariboo..... 249
Trip to Eastern States.....	Quatsino..... 250
Chilcotin river, minor reference to.....	Coal-miners' examinations, candidates for... 35
Chimney-tiles.....	Coal-mines (<i>see also</i> Collieries), number
China creek.....	men employed..... 245
Chinese, gold-mining in Cassiar.....	Coast District..... 245, 246
Chopaka.....	Nicola-Princeton..... 247
<i>Cinderella</i>	Vancouver Island..... 247
<i>City of Spokane</i>	Inspection of..... 251, 252
Clay from Canadian collieries.....	Western Fuel Co., output of..... 252
West coast, V.I.....	New developments..... 249
Clayburn.....	Old collieries reworked..... 250
Clayburn Company, Ltd., brickyards.....	East Kootenay, labour troubles in..... 20
CLAYOQUOT MINING DIVISION:	Canadian Collieries, labour troubles in... 20
Report of Deputy Mining Recorder.....	Reference to output..... 18
Notes by H. Carmichael.....	Explosion at Merritt..... 29
Clearwater river.....	Coal-mine officials, list of..... 33, 38
CLINTON MINING DIVISION:	"Coal-mines Regulation Act"..... 33
Report of Gold Commissioner.....	Coal-mining in British Columbia, summary of... 242
Clue lake.....	Coal potentialities of British Columbia..... 249
<i>Clyde-Belt</i>	Coal creek (Fort Steele)..... 295
Coal, Groundhog, referred to.....	(Peace River)..... 123
Groundhog, report by Provincial Mineral-	Coal Creek Colliery..... 297
ogist.....	Coal-cutting machines in use..... 289
Gross production of year.....	Coal-dust, analysis of, after explosion..... 229
Output of various districts.....	Coal gully..... 281
<i>Per capita</i> production of various districts... 242	Coal Hill Syndicate (<i>see also</i> new name,
Markets of various districts.....	Inland Coal and Coke Syndicate)..... 22, 283
Table of distribution.....	Coalmont..... 22, 190
Sales of.....	Coast collieries, output statistics..... 21
Tuya river.....	COAST DISTRICT:
Biernes creek.....	Statistics, minor reference..... 18
Atlin.....	Gold production of..... 23
Tulameen river.....	Reference to quarries of..... 27
Skeena river.....	Iron-ores..... 25
Eaglenest creek.....	Copper production..... 25
Klappan river.....	Coal of..... 193, 243
Similkameen.....	Coast Inspection District, report of Inspector... 238
Nicola.....	Cody..... 149
Greenwood.....	Coke, production table..... 11
Skidegate inlet.....	Reference to output..... 18
Peace river.....	Making of, on Coast..... 21
Cariboo.....	Iron blast-furnace..... 26
Queen Charlotte.....	Peace River coal..... 133
Masset.....	Production of year..... 245
Graham island.....	Pennsylvania used..... 169, 243
Princeton (lignite).....	Coldwater hill..... 280
Production table.....	Coldwater river..... 216, 284
Analysis table, Peace river.....	Collieries (<i>see also</i> Coal-mines), East Koot-
Quality of, Peace river.....	enay District, output of for year and
Skeena river.....	tables..... 248
Stikine and Nass rivers.....	Collins gulch..... 190, 293
Queen Charlotte.....	Collision bay..... 110

	PAGE.		PAGE.
Colonial	149	<i>Copper Queen</i>	110
Columbia canyon, Atlin	57	Copper River Coal Claims, Ltd.	115
Columbia Coal and Coke Co., reference to work done	22, 190, 249	Coquihalla river, dredging	186
Annual returns	293	Corbin	221, 294
Columbia river	52	Corbin Coal and Coke Co.	20
Minor references to	139, 143	Reference to output	294, 303
<i>Commodore</i>	191	<i>Cornell</i> , Texada island	197
Comox, pottery-clay from	27	<i>Coronado</i>	114
Reference to coal-measures	125	Coronation Mines, Ltd.	191
Colliery at	272, 273, 274, 276	<i>Cosmopolitan</i>	106
Reference to town	271	Costs of mining	168
Comstock	105	Cougar lake	100
Consol. M. & S. Co., opening of <i>Sullivan</i>	24	<i>Countless</i>	191
References to company	146, 152, 155, 161	Courrier creek	87, 92
Reference to <i>Society Girl</i>	237	Cramer-Wolf safety-lamp	280, 286
<i>Cooper</i>	202	Cranberry district	258
Cooper creek	147	Cranberry lake, source of Canoe river, Cariboo	52
Cooper Creek Mining Co.	50	Cranbrook, Inspector's office at	204
<i>Copper</i>	194	Croked river	119
Copper (Alberni)	193	<i>Crown</i>	147
Red Cliff mine	104	Crown Mining Co.	147
Dease river	81	Crown mountain	201
Vancouver Island	198	Crowsnest coalfield, coal-measures, reference to	125
Annual production	24	Crow's Nest Pass Coal Co., minor reference to	29, 297, 294, 303
East Kootenay	138	Crushed rock	9
Quesnel	54	Cultus creek	155
Reference to output	18	Cumberland, coal-miners' examination	35
Voight camp	189	Inspector's office at	204, 271
<i>Copper Hill</i>	114	Coal development near	250
Copper island	110	Cumshewa inlet	110
<i>Copper King</i> (Clayoquot)	194	<i>Czar</i>	180
" (Kamloops)	184		
Copper mountain	166, 190		

D.

Davenport creek	60	Diamond Vale Collieries— <i>Concluded</i> .	
Davis lake	119	Output	20
Dawson, Dr., reference to gold statistics of..	70	Reference to	296
Notes on Taliltan basalt	72	<i>Dickens</i>	197
Dease Lake trail	76	Discovery creek	89, 95
<i>Deadman</i>	149	Divided-Lake View Consolidated Gold Min- ing Co.	182
Dease creek, reference to	29, 63, 64, 70, 71	Dixon creek	184
Water used for hydraulic mines	77	<i>D.L.S.</i>	103
Dawson's report	80	Dog-team, transportation by	64
Dease lake, minor reference	29	Dominion Block, Peace River land	127
Placer of	61	<i>Dominion Day</i>	115
Report of Provincial Mineralogist	65	Dominion mountain	155
Reference to	68, 69	<i>Double Standard</i>	195
Freights from Wrangell	77	Douglas seam	254
Dease river, reference to history	69, 77, 81	Downie creek	143, 144
Deep creek	124	Draeger apparatus, equipment at various mines	204
Deer creek	155	Morden Colliery	267
<i>Dellie</i>	147	Canadian Collieries	271
Deloire river, or Liard river	69	Reference to	207, 281, 295
Department of Mines referred to	69	Drain-pipe	27
Destline creek	82	Dredging, Cariboo	51
Destline lake	81, 82	Fraser river	186, 192
Determinations free, Government Assay Office	31	Drilling for coal, Masset	249
Devil's Portage, on Liard river	69	Duncan river	147
Diamond-drilling, Granby	168	<i>Dundee</i>	154
Lynn creek	202	Dunvegan	127
Diamond Vale Collieries, Ltd., report of Inspector	285	<i>Durham</i>	161
Distribution of output	283	Dust in mines allayed by exhaust-steam....	216
Explosion at	216, 224	Duti river, coal on	94
Plan of working	234		
Reference to explosion	29		

E.

PAGE.	PAGE.		
Eagle creek.....	152	Esquimalt, lime-kilns at.....	199
Eaglenest creek, coal on.....	81	E. & N. Railway.....	269
Eastmout.....	150	Eureka (Ainsworth).....	148
Edmonton, minor reference.....	52	.. (Nelson).....	152
Eighteen-mile creek.....	182	.. (Slocan).....	149
Eight-mile creek.....	122, 133	Eureka Copper Mines, Ltd.....	152, 166
Electro-thermic smelting of iron-ore.....	26	Evening Star.....	202
Eldorado creek, placer gold.....	192	Evening Sun.....	108
Elkhorn.....	167	Examinations for miners.....	34
Elk river.....	195	.. Mine officials.....	33
Emerald.....	152, 155	Exhaust-steam for humidifying mine air.....	216
Emma.....	143	Exit passage, coal under.....	256
.. Fire at.....	164	Explosion, Diamond Vale Colliery, report on, .. by Chief Inspector.....	224
Empire (Omineca).....	115	.. Report on, by Provincial Mineralogist.....	216
.. (Lillooet).....	192	.. Reference to.....	29
Engincer.....	60, 61	Explosives, testing of.....	209
Enterprise.....	161	Extension.....	115
Erie.....	155		

F.

Fawn creek.....	155	Forest Rose.....	49
Ferguson.....	151	Fort George, Indians of.....	118
Ferguson Mines, Ltd.....	151	Fort Steele.....	139
Fernie, coal-miners' examinations at.....	35	FORT STEELE MINING DIVISION.....	137
.. Inspector's office at.....	204, 295	.. Lead.....	24
Fiddick Colliery.....	264, 265, 266	Fossil leaves, Klappan river.....	85
Fidelity.....	151	.. Peace river.....	129
Field, zinc at.....	25	.. Stikine.....	72
Finland Girl.....	106	Four Leaf Clover Mining Co.....	50
Finlay rapids.....	121	Four-mile creek (Quesnel).....	53
Fir.....	119	.. (Slocan).....	148
Firebrick.....	9, 27	Francis.....	108
First aid to injured, progress in.....	207	Franklin.....	107
Five-mile creek.....	187	Fraser river, reference to.....	119
Fleming.....	202	.. Dredging, Cariboo.....	51
Flood, glacier, Stikine river.....	66	.. Mica on.....	52
Florence.....	108	.. Dredging, Yale.....	186, 192
Florence Mining Co.....	147	French's platinum method, reference to.....	160
Flossie.....	106	French creek.....	143
Fluess apparatus.....	207	.. Water for hydraulic mines on Berry creek.....	77

G.

Galena.....	24, 113, 117	Glenora, railway features.....	68, 76
.. Quesnel Mining Division.....	54	Glory-hole mining at Granby mines.....	176
.. East Kootenay.....	138	Gold, discovery of, in Cassiar.....	70
.. Omineca.....	105, 106	.. Discovery of, in Deloire river.....	69
.. Dease river.....	81	.. Princess Royal island.....	102
.. Reference to.....	202	.. Character of, on Stikine river.....	74
Gallagher.....	147	.. Dease creek.....	80
Galloway, C. F. J., report on Peace River coal.....	118	.. Thibert creek.....	78
Gambier island.....	203	.. Proportion of product from milling and .. smelting.....	23
Gas in mines.....	272, 298	.. Production of.....	23
George island.....	110	.. Production in Atlin.....	23
Georgia river.....	105	.. Yale.....	188
Gerrard.....	151	Gold, free-milling.....	153
Gething creek.....	122	.. Perry creek.....	137
.. Diagram of coal-measures.....	134	.. Slocan City Mining Division.....	150
Giscome Portage.....	119	.. Hedley.....	23
Glacial action, Stikine river.....	72	.. Portland Canal.....	105
Glacial clay in hydraulic mine.....	56	Gold, placer, tables.....	10, 168
Glacier creek.....	103, 108	.. Reference to output.....	18
Glacier Creek Mining Co.....	101	.. Annual production.....	23
Gladstone.....	57	.. Becoming exhausted.....	23
Gladys lake.....	60	.. Tax evaded.....	23
Glen mountain.....	112	.. Reference to excitement at Dease lake.....	29
Glenora, geology.....	72	.. Discoveries in Cassiar.....	23
.. Reference to.....	71		

	PAGE.		PAGE.
Gold, placer, reported strike in Atlin	60	Grand Rapids, Stikine river, geology	72
Peace river	118	Grand Trunk Pacific Railway .. 52, 111, 114,	116
Bear river (Portland Canal)	104	Coalfields on	249
Louis creek (Yale)	184	Granite as building-stone	27
Yale	186	Dease Lake trail	72
Lillooet	192	Granite creek	190
Similkameen	183	Coal of	293
Gold, placer-mining, Revelstoke	142	Granite mountain	152
Dease lake	64	<i>Granite-Poorman</i>	26, 157
Platinum	26	Platinum reported in	153
Gold creek	115	Grant mountain	127, 129
<i>Gold Drop</i>	167, 175	Gravel	9, 28
Golden	139	"Graveyard," Little Klappan river	84, 95
<i>Golden Belle</i>	155	Great Canyon of the Stikine	72
<i>Golden Gate</i>	194	Great Northern mountain	151
GOLDEN MINING DIVISION:		Great Northern Railway	154
Report of Gold Commissioner	139	At Phoenix	176
Zinc in	25	At Similkameen	292
<i>Golden Star</i>	105	<i>Great Ohio</i>	114
<i>Golden Zone</i>	181	Greenwood (town)	163, 167
Gold Plate Mines Co.	181	Smelter at	153
Goldstream, electric plant at	198	GREENWOOD MINING DIVISION:	
Goose creek	53	Report of Gold Commissioner	167
<i>Gordon</i>	195	Notes by Provincial Mineralogist	163
Graham, Thos., report as Chief Inspector ..	204	Coal in	168
Reference to	34	Placer-mining	168
Graham island	111	Grenville mountain	162
Collieries on	278	<i>Groundhog</i>	115
Graham Island Coal and Timber Co.	111	Groundhog (see Marmot).	
Graham Island Collieries	111	Groundhog coal, analyses of	98, 116
Granby bay	99	Groundhog coalfield	92
Report on Granby Co.'s property	173	Geology, topography	96
Granby Consolidated Mining, Smelting and		Route to	81
Power Co.	167, 168, 175	Report by Provincial Mineralogist	65
Granby Cons. M. & S. Co., Granby bay	99	Minor reference	30
Granby smelter, shipments from Washington		Coal referred to	64, 249
State	183	Groundhog mountain	90, 94
Description of work done	172	Analysis of coal	95
Grand Forks, smelter at	167, 169	Visit of Provincial Mineralogist	30, 81
GRAND FORKS MINING DIVISION:		Ground-huicing in prospecting	191
Report of Gold Commissioner	174	Guggenheims, reference to, in Quesnel	53
Notes by Provincial Mineralogist	168	Gun-a-noot, Indian outlaw	84
Grand Rapids, Stikine river	67	Gypsum	9, 185
H.			
Hematite	26, 189	<i>Highland</i>	146
Hall creek (Nelson)	154	<i>Highland Bay</i>	114
" (Ainsworth)	147	Highland valley	185
<i>Hamilton</i>	150	Hills Bar	186
Hammil creek	147	Hills Bar Gold Dredging Co.	187
Hankin creek (see also Tenas creek, Spatsizi)	86	Hobson Mining Co.	150
Harpers camp	54	Hobson Silver Lead Co.	154
Harriet harbour	110	<i>Hollinger</i>	195
Harris Mines, Ltd.	112	Hollyburn mountain	200
Hastings B.C. Syndicate	155	<i>Homatsa</i>	194
Hazelton, minor reference to	30, 81, 111-116	<i>Homestake</i>	110
Route to Groundhog	65, 94	Homatsa (Sloan)	149
Coal near	249	" (Yale)	187
Hazelton Nine-mile Mining Co.	113	Horsely Gold Dredge and Mining Co.	54
<i>H.B.</i>	152	<i>Horseshoe</i>	151
Hedley, stamp-mill at	23, 237	Hosmer	294
Hedley Gold Mining Co., reference to	163, 179, 237	Hosmer Mines, Ltd., reference to output ..	20, 294
Hedley mountain	178	Howe sound	200, 238
Hemlock timber, Klappan river	83	<i>Hudson Bay</i>	155
<i>Hercules</i>	110	Hudson Bay mountain	114
Hercules Mines, Ltd.	106	Hudson Bay Mountain Mining Co., Ltd.	115
Hidden creek	188	Hudson hope	122, 127
Hidden Creek Copper Co., report by superin-		Hudson's Bay Company, Dease lake	79
tendent	173	Navigation of Stikine river	65
		Old post at Glenora	68

	PAGE.		PAGE.
Hudson's Bay Company, Liard river	69	Hydraulic mine, Dease lake	64
<i>Humming Bird</i>	115	"Season" in Atlin	56
Huston inlet.....	110	Hydro-magnesite, Atlin.....	61
Hydraulic mine, peculiar sloughing or caving of bank, Atlin.....	55		
I.			
<i>Idaho</i> (Trail creek).....	161	Inspector of Mines' report, West Kootenay and Boundary Districts.....	235
" (Quatsino)	196	East Kootenay District.....	237
<i>Idaho-Alamo</i>	149	Similkameen District.....	237
<i>Ikeda</i>	110	Coast District.....	238
Ikeda bay.....	110	Diamond Vale explosion	209
Illustrations, Diamond Vale Colliery plan.....	234	Inspection of mines, personnel and organiza- tion of inspection staff.....	204
Gething creek, sections of coal.....	134	Report of Chief Inspector.....	204
Johnston creek, sections of coal.....	131	Interior plateau.....	67
Moose Bar creek, sections of coal.....	131	Iron, Texada island.....	197
Peace River, sections of coal.....	128	Port Renfrew.....	198
Peace river, map of coalfield.....	126	In British Columbia.....	25
Surf Inlet gold-mines, map	101	Skeena	99
Tahltan, basalt cliffs at	73	Alberni	193
Incomaplex river.....	142	Magnetites	25
Independence mountain.....	182	Louise island.....	111
Indian Mines, Ltd.....	104, 105	Electro-thermic smelting	26
Indian river.....	200	<i>Iron Duke</i>	180
<i>Ingenika</i>	114	<i>Iron Horse</i>	161
Inland Coal and Coke Co., Ltd.	20, 188, 233	<i>Iron King</i> (Clayoquot)	195
Report of inspection.....	283	" (Omineca)	115
Distribution of output.....	284	<i>Iron Mask</i>	161
Inland Coal and Coke Syndicate (Coal Hill Syndicate)	22	<i>Ironsides</i>	171
<i>Inland Empire</i>	162	Iskut Mining Co.....	64
Inland Mining Co.....	162	Iskut river.....	66, 81, 82
Inspection of collieries, report of Inspector, Northern District of Vancouver Island.....	271	<i>Island Belle</i>	195
Inspection of metalliferous mines, West Koot- enay and Boundary Districts.....	235	<i>Ivan</i>	110
East Kootenay	237	<i>Ivanhoe</i>	195
Similkameen	237	<i>I.V.L.</i>	162
J.			
<i>Jack of Clubs</i>	194	<i>John D.</i>	105
Jackson camp.....	90, 93	Johnson creek (Peace river).....	122, 131
Jackson creek.....	91	" (Atlin)	60
Jackson mountain, coal from.....	95	Johnston's camp.....	93
<i>J. and L.</i>	144	<i>Josie</i>	161
Jedway, removal of Gold Commissioner.....	109, 110	<i>Jumbo</i>	187
<i>Jennie Belle</i>	154	<i>Juniper</i>	113
<i>Jewel</i>	167	Juniper creek.....	113
K.			
<i>Kallappa</i>	194	<i>Kilo</i>	150
KAMLOOPS MINING DIVISION:		King Solomon Mines Co.	147
Report of Gold Commissioner	184	<i>Kingston</i>	181
Kamloops-Yale, copper production	25	Kitsalas	115
Kaslo	146	Klappan river	83, 94, 98
Kaslo creek, South fork	146, 148	" Klappan summit"	83
K. & S. Railway, reference to damage by fire	24	Klastline river, Government bridge and trail	81, 82, 83
Keary lake	119	Klehini river	61
Keefers	186	Kloochman canyon, Stikine river	67
Keffer, Frederic	164	Kluakaz river	85, 86, 95
Keithley creek	53, 54	Kluatantan river	94, 97
<i>Kelly</i> (mica)	53	Kluayetz river	94
<i>Kemtrille Extension</i>	201, 202	<i>Knob Hill</i>	167, 175
Kettle river, reference to	167, 177	Kokanee creek	153
<i>Kcystone</i>	144	Kootenay, East	22
Keystone creek	141	Coal-mine labour troubles	20
Khntze inlet	99	Coal in	243
Kiekane inlet	99		

PAGE.		PAGE.
	Kootenay, East, coal companies	291
	Kootenay, North-East, reports of Gold Commissioner	139, 302
	Kootenay, South-East, report of Gold Commissioner	137
	Report of Inspector	295
	Kootenay, North-West, report of Gold Commissioner	142
L.		
	Laboratory and mineral exhibit, moving of ...	30
	Labour troubles, East Kootenay coal-mines... Canadian Collieries (Vancouver Island)...	20
	Lachmund, Osear	167, 164
	Ladybird	106
	Ladysmith	198, 271
	Laketon	69, 77, 79
	Lake View (Portland Canal)	109
	" (Osoyoos)	182
	Langlois creek	92, 95
	LARDEAU MINING DIVISION:	
	Report of Mining Recorder	145
	Report of Inspector	236
	Lardeau river	151
	Lardo, marble-quarry	27
	Lardo-Trout Lake Railway	27
	Last Chance	115
	Latona Mining Syndicate	203
	Lava-beds, Klastine river	82
	Lava-flows in vicinity of Tahltan	72
	Lawn point	196
	L.B.	151
	Lead, method of calculating values	21
	Output	24
	Separation processes	25
	Lead King	113
	Leadville	108
	Lemon creek	150
	Leora	195
	Le Roi	161
	" No. 2	161
	Le Roi No. 2, Ltd.	161
	LIARD MINING DIVISION:	
	Report of Gold Commissioner	63
	Liard river	68
	Referred to as "Vre" or Deloire	69
	Transportation on	77, 79
	Lightning creek	50
	Lightning Creek Gold Gravels and Drainage Co.	50
	Lightning Creek Hydraulic Mining Co.	50
	Lignite, Tuya river	75
	<i>Kootenay Belle</i>	155
	Kootenay Central Railway	141
	Kootenay lake, marble-quarry	27
	Kruger mountain	178, 182
	Kumecoleon inlet	99
	Kyuquot sound	196
L.		
	Lignitic coal	249
	LILLOOET MINING DIVISION:	
	Report of Gold Commissioner	191
	<i>Lily B.</i>	150
	Lime	9, 28
	Lime-silica brick made at Victoria	199
	Limestone	9
	Dease lake	72
	Peace river	127
	Tod inlet	198
	Lincoln creek	59
	List of certificated coal-mine officials	38
	<i>Lipton</i>	109
	<i>Little Billie</i>	197
	Report of Inspector	238
	Little canyon, Stikine river, heavy snow at 76.	67
	Little Deloire creek	63, 79
	Little Emory creek	186
	<i>Little Joe</i>	191
	Little Klappan river	S3, S6, 94
	Lockeport	110
	Lode mines, production of	10
	Dease lake	S1
	Lode-mining (see Gold, Silver, Copper, etc.).	
	<i>Lone Bachelor</i>	149
	<i>Lone Star</i>	163
	Lorne Amalgamated Mines, Ltd.	191
	<i>Lost Cabin</i>	151
	Louis creek, placer	181
	Louise island, iron	111
	<i>Louch</i>	49
	Lowhee creek	49
	<i>Luce</i>	53
	<i>Lucky Boy</i>	151
	<i>Lucky Jim</i> (Clayoquot)	194
	<i>Lucky Jim</i> (Slocan)	25, 146
	Zinc production	149
	<i>Lucky Swede</i>	106
	<i>Lulla Fraction</i>	161
	Lynn creek, zinc	200, 201
	Lynn Creek Zinc Mines, Ltd.	201
M.		
	Mackenzie river referred to	69, 77, 135
	<i>Macstro</i>	146
	<i>Maggie</i>	195
	Magnetite on Texada island	26
	On Vancouver island	26
	Coast District	25
	<i>Malaspina</i>	197
	Mallock, G. S., report on Groundhog	93, 94
	Reference to Groundhog	85, 88
	Maluin Syndicate	59
	<i>Mamie</i>	195
	<i>Mammoth</i>	197
	Maple bay	105
	Marble for building at Lardo	27
	Kootenay lake	27
	<i>Marble Bay</i>	197
	Lime-kilns at	28
	Report of Inspector	238
	<i>Marconi</i>	191
	Mark creek	157
	Marmot, animal	84
	Marmot river	105
	Marten creek	53
	<i>Martha Ellen</i>	106
	<i>May Blossom</i>	154
	<i>McAllister</i>	149

	PAGE.
McBride, Sir Richard	5
McCulloch creek	143
McDame creek	64, 70, 79
McDonald creek, coal from	95
McEvoy flats	87, 88, 91, 93
McGillivray	224
McGillivray creek	192
McGillivray Mountain Mines, Ltd.	192
McGuigan basin	149
McGuire	110
McKee creek	55
McLennan range, mica in	52
McLeod lake, Indians of	118, 120
McLeod Lake Post	120
Meadow creek	147
<i>Meal Ticket</i>	110
Meares island	194
Men employed in mines	16
Merril cyaniding plant	155
Merritt, reference to coal-mine explosion ..	29
Coal-miners' examinations at	35, 188
Inspector's office at	204, 216, 280
<i>Merry Widow</i>	196
Mestua river	81
Metalliferous mines, production table	13
Inspection of	235
Metalliferous-mine accidents, causes of ..	208
Tabulated as to cause	241
Detailed list of	240
Inspector's report	235
<i>Meteor</i>	150
Mica at Tete Jaune Cache, notes by H. Carmichael	52
Mica creek	143
Mica mountain	52
Michel Colliery	296, 303
<i>Mickey</i>	194
Middlesboro Colliery, annual report	280
Midway	167
Reference to coal near	168
Mile 53, G.T.P.R., Tete Jaune Cache, minor reference to	52
<i>Millie Mack</i>	160
Mine Inspectors' Institute of U.S., Annual Convention, 1912	206
Papers read at	209
Mineralogist, Assistant, retirement of H. Carmichael	30
Mineral products	8
Tables of	14, 15

	PAGE.
Minerals Separation, Ltd., process used	201
Mine-rescue work, progress in, during year ..	206
Miners, examinations for	34
Mines, shipping	16
Non-shipping	17
<i>Mining Magazine</i> , reference to report on Rainy Hollow	61
Miscellaneous products, Table V.	9
Mission creek	113
<i>Molly Gibson</i>	153
<i>Monarch</i> (Golden)	139
" (Slocan), zinc	25
<i>Montana</i>	110
<i>Monte Christo</i>	161
<i>Montezuma</i>	196
Monzonite, Nickel Plate	181
<i>Moonshine</i>	115
Moose Bar creek	123
Sections of coal-measures	131
Moosehorn creek	60
Moose lake	57
Morden Colliery	267
Morehead creek	53
Morehead Mining Co.	53
Morice river	115
<i>Morning</i>	180
<i>Morning Star</i>	202
Morrissey	296
Morrissey creek	295
Mosquito creek (Liard)	63
" (Cariboo)	50
Moss river (<i>see</i> Klumatantan).	
<i>Motherlode</i> (Nelson), stamp-mill at. .23, 152, 155	155
" (Greenwood)	163, 236
<i>Mountain Chief</i>	107
<i>Mountain Cow</i>	149
Mountain of Rocks canyon	118, 127
Mount Gladstone Mining Co.	108
Mt. Baker and Yale Mining Co.	188
Mount Carbon Colliery	293
Mount Selwyn	121
Mount Stephen	140
Mt. Stephen Mining Syndicate	139
Moyie lake	137
<i>Mucho Oro</i>	49
Mud creek	113
<i>Mugwump</i>	161
Muscovite, occurrence of	52
Mustang creek	51

N.

Naden harbour.....	111
" Nahlin," gasoline-boat on Stikine river....	65
Nanaimo, C.M.I. meeting at	95
Reference to coal-measures at	125
Coal-miners' examinations at	35
Rescue-station at.....	207
Inspector's office at.....	204, 258
NANAIMO DISTRICT.....	197
Nanaimo harbour.....	250
NANAIMO MINING DIVISION :	
Report of Gold Commissioner.....	197
<i>Napoleon</i>	163
Nass river, reference to coalfields, .30, 65, 91	91
Reference to.....	83, 92, 98
Nation river.....	121
<i>Nelson Daily News</i> , article on Granby, refer- ence to.....	175

NELSON DISTRICT :

Minor reference.....	18
Report of Gold Commissioner.....	152
Inspector's report.....	236
Nelson island.....	200
NELSON MINING DIVISION :	
Gold production, reference to.....	23
Copper production, reference to.....	25
Platinum reported.....	26
Reference to platinum investigations	30
Report of Gold Commissioner.....	152
Platinum report by Provincial Mineralogist	156
Shipments to Grand Forks smelter.....	163
<i>Nettie L.</i>	151
Nettie L. mountain.....	151
Newcastle	269
Newcastle island, coal under.....	250
<i>New Crow</i>	194

	PAGE.		PAGE.
New Denver	150	Nicola Valley Mutual Improvement Association	207
New Dominion Copper Co.	163	Nigger Head mountain, Tete Jaune Cache, mica at	52
New Westminster	186	Nine-mile mountain	112
NEW WESTMINSTER MINING DIVISION:			
Report of Gold Commissioner	199	98	144
Nickel reported	31	<i>Noble Five</i> (Ainsworth)	149
<i>Nickel Plate</i> , stamp-mill at	23, 178	" (Slocan), zinc from	25
Minor reference to	237	<i>Noonday</i>	149
Nickel Plate mountain	237	Nootka Sound marble-quarries	27
Nicola-Princeton coalfield	243	North Bend, dredging at	187
Nicola-Princeton Inspection District, report of Inspector	279	North Columbia Gold Mining Co.	55, 56
Nicola	185	Northern Terminus Mines, Ltd.	109
NICOLA MINING DIVISION:			
Report of Mining Recorder	188	"Northland Echo" (steamer)	125
Nicola river	216	<i>North Star</i>	137
Nicola valley, coal output of	20, 22	<i>Nugget</i>	155
Nicola Valley Coal & Coke Co., Ltd., Middleboro Colliery, report of inspection ..	280, 282	Nugget gulch	51
Reference to output	20, 189, 208, 216, 280	<i>No. 1</i> (Ainsworth)	146
		" (Trail creek)	161
		<i>No. 7</i>	167
		O.	
Observatory inlet	99, 173	Office statistics, Victoria	199
O'Donnell river	59, 60	Windermere	141
Office statistics, Ainsworth Mining Division	148	Yale	188
Alberni	193	Ogden Gold Mining Co.	50
Arrow Lake	160	Oil, Vancouver Island	198
Ashcroft	185	Otard bay	111
Clayoquot	194	Oil-fuel from California, reference to ..	21, 244
Clinton	192	<i>O.K.</i>	104, 108
Fort Steele	138	O.K. mountain	162
Grand Forks	178	<i>Old Chum</i>	109
Greenwood	168	<i>Old Ironsides</i> (Grand Forks)	175
Kamloops	184	" (Greenwood)	167
Lardeau	145	<i>Old Sport</i>	196
Lillooet	192	Old Town	137
Nanaimo	197	Old Wellington seam	269
Nelson	156	One-mile creek	292
New Westminster	200	<i>Oregon</i>	182
Nicola	189	Oroville (U.S. town)	183
Omineca	116	OSOYOOS MINING DIVISION:	
Osyoos	183	Reference to stamp-mill	23
Portland Canal	109	Report of Mining Recorder	178
Quatsino	196	Placer-mining	163, 183
Queen Charlotte	111	Otard bay, boring for oil	111
Revelstoke	142	Otter creek	59
Similkameen	190	Ottertail river	121
Slocan	150	OMINECA MINING DIVISION:	
Slocan City	150	Report of Gold Commissioner	111
Trail Creek	162	Notes by Provincial Mineralogist	116
Trout Lake	151	Omineca River district, placer mines	115
Vancouver	203	Oyster harbour	271
Vernon	183	Oyster Harbour Collieries	271
		P.	
Pacific Coast Coal Mines, Ltd., reference to output	20	Parsnip river	120
Table of output	263	Peace river	120
Reference to	250	Sections of coal-measures	128
Pacific Coast Collieries Co. of B.C., table showing output and men employed ..	288	Map of coalfield	126
Annual returns	233, 249, 287	Geology of coalfield	125
Pacific Coast Exploration Co.	104, 109	H.B. steamer on	122
Pack river	120	Placer gold	118
<i>Pack Train</i>	161	Coal on	249
Paradise creek	100	Peace River Crossing	124
Paradise lake	100, 103	PEACE RIVER MINING DIVISION:	
Parle Pas rapids	121, 127	Notes by Provincial Mineralogist	117
		<i>Pearl Fraction</i>	161
		Pegmatite	52

	PAGE.
Pemberton trail	200
<i>Perrier</i>	153
Perry creek	137
<i>Pete</i>	195
<i>Peterboro</i>	57
Peters creek	50
<i>Phoenix</i>	162
Phoenix	163, 168, 175
<i>Phoenix Amalgamated</i>	167
<i>Pilgrim</i>	161
Pillar-and-stall mining	303
Pine creek	55, 57
Pine Creek Flume Co.	57
Pine Creek Power Co.	56
Pine river (North)	127
(South)	127
Pine River pass	127
Pingston creek	160
<i>Pioneer</i>	191
Pittsburg-British Gold Co.	55
Placer gold	10
Reference to output	18, 23
Dease lake	68
Reported discoveries in Cassiar	23
Yale	186
Placer Gold Mines Co.	58
Platinum, Dease creek	80
Thibert creek	63, 78
Yale	186
Platinum, reference to production	26
Method of extraction claimed by A. G. French	26
Report on Nelson District	156
Government and other assays, mode of	31
The Nelson dykes	158
Pleasant valley	51
Poker	57
<i>Poorman</i> (Trail creek)	161
<i>Poorman</i> (Nelson)	23
Stamp-mill at	26
See also <i>Granite-Poorman</i> .	
Porteau	200
Porter	77, 79
Porter's Landing (<i>see</i> Porter).	
<i>Portland</i>	108
Portland Bear River Mining Co.	107

	PAGE.
PORTLAND CANAL MINING DIVISION:	
Report of Mining Recorder	103
Portland Canal Mining Co.	103, 109
Portland Canal Tunnels, Ltd.	103, 109
Portland cement, production of	28
Portland Cement and Construction Co. . .	28, 198
Portland Wonder Mining Co.	104, 108
Port Renfrew, iron at	198
Pottery	9, 27
Powder, expensive in Atlin	56
Prices used in tables	7, 24
<i>Prince Alfred</i>	194
Prince Rupert, cement at	28
Reference to	30
<i>Princess</i> (Portland Canal)	105
(Greenwood)	166
<i>Princess Royal</i>	100, 103
Princess Royal island	99
Report by Provincial Assayer	100
Princeton, coal production	22
Cement at	28
References to	166, 190, 249, 289
Princeton Coal and Land Co.	20
References to output	190, 249, 289, 290
Processes for separation of lead-zinc-silver ores, reference to	25
Producers Rock and Gravel Co., Ltd.	199
Production of minerals, tables	7
Progress of mining	16
Provincial Assayer, report on Princess Royal island	100
Report on Clayoquot Mining Division	195
Provincial Mineralogist, investigate platinum at Nelson	26
Work of year	29
Reference to Groundhog trip	64
Q.C. islands, notes on	111
Nelson, report on platinum	156
Diamond Vale explosion, report on	216
Grand Forks Mining Division, notes on ..	168
Higbland valley report, reference to	185
Similkameen, notes on	189
Boundary, notes on	163
Notes on <i>Britannia</i>	201
P'tarmigan Mines (Co.)	193
Puntledge river	271
Pyrrhotite	194

Q.

"Quantity and Quality of Mine Air," reference to paper	210
Quartz creek	70
Quartz-mining (Cariboo)	51
(Yale)	187
Quatsino Coal Syndicate	196
<i>Quatsino King</i>	196
QUATSINO MINING DIVISION:	
Report of Mining Recorder	196
Quatsino sound	196
<i>Queen</i>	23
Stamp-mill at	152, 151
Queen Charlotte	109
Queen Charlotte Island shales, reference to. .	125
Queen Charlotte Mining and Development Co. .	110

QUEEN CHARLOTTE MINING DIVISION:	
Reference to notes by Clapp	111
Notes by Provincial Mineralogist	111
Report of Gold Commissioner	109
<i>Queen Victoria</i> (Nelson)	152
(Greenwood)	163
Quesnel Forks, minor reference to	53
Quesnel lake, galena on	54
Quesnel Hydraulic Mining Co.	53
QUESNEL MINING DIVISION:	
Lode-mining in	54
Copper in	54
Report of Mining Recorder	53
Quesnel river, dredging leases	51, 54
North fork	53

R.

<i>Radford</i> (hydraulic)	64
Radford, Al. C., death of	56, 61

Railways and Canals Department, surveys in B.C.	83
--	----

	PAGE.		PAGE.
Rainfall, poor in Atlin	55	Robertson, W. F., Provincial Mineralogist, trip to Dease lake, Groundhog coalfield	65
Rainy Hollow	61	Grand Forks Mining Division	168
Rambler-Cariboo	146, 149	Report on Boundary	163
Rath bar	70	Rocher D'Éboulé Copper Co., Ltd.	113
Raven	197	Rocher D'Éboulé mountain	113, 114
Rauhide	163	Roche river	190
Raymond & Sons, lime-burners	28	Rock and gravel, production of	28
Reco	149	Rock creek	168
Red brick	9, 27	Rocky mountains, referred to	69
Red Cliff Mining Co.	104, 107	Coal of	249
Redeemable Investment Co.	181	Roosevelt	194
Red Elephant	147	Rosalia Mining Co.	161
Red Mountain	161	Rose	195
Red Reef	106	Rose and Belle	197
Reliance Mining Co., report of Inspector ..	238	Rosebank Lime Co.	199
Reno	196	Rosella creek	79
Rescue apparatus, equipment at various collieries	206	Rosella Mining Co.	79
Fernie	294	Rose Marie	195
Middlesboro	281	Rossland	235
Nanaimo	207	ROSSSLAND DISTRICT:	
Princeton	290	Copper production	25
Rescue-work at Diamond Vale explosion ..	232	Gold production	23
Reserve shaft (coal-mine)	250	Report of Gold Commissioner	161
Reservoir	114	R.N.W. Mounted Police, referred to, at "Boundary," Stikine river	66
REVELSTOKE MINING DIVISION:		Old camp at Klastline river	82
Report of Mining Recorder	142	Ruby creek	58
Lode-mining	144	Ruby Fracture (Portland Canal)	107
Richardson mine	266	" (Trail creek)	161
Richmond (Slocan)	149	Ruth (Portland Canal)	108
" (Trail creek)	162	" (Slocan)	149
Riondel	147		
Riprap	9		
		S.	
Saanich arm, lime-kilns	28	Shale from Kyuquot sound	196
Cement-works	198	Shale-quarry, pottery-clay	27
Saanich inlet, cement-works	198	Shamrock	196
Sadie	195	Shawni lake	94
Safety-lamps	233	Sheep creek	152
St. Eugene	24	SHEEP CREEK DISTRICT	154
Minor reference	137	Inspector's report	235
Report of Inspector	237	Shipping mines, table of	16
St. Mary river	137	dney island, brickyards	199
St. Patrick	147	Silica brick	9
Salmo	155	Silver, reference to output	18
Salmon, Indian food	74	Production affected by labour troubles ..	23
Salmon arm	200	Reference to separation processes	25
Salmon river (Portland Canal)	101, 105	Silver, Portland Canal	106
" (Nelson)	156	Princess Royal island	103
Salmon-Bear River Mining Co.	104, 105	Slocan	24
Sand	9	Silver Creek	115
Hydrauliclicking	28	Silver creek (Atlin)	60
Sand Creek (mica claim)	52	" (Yale)	187
Sand creek, mica on	52	Silver Cup	151
Saulter Landing	125	Silver Cup Extension	113
Sawridge	125	Silver Cup Mines, Ltd.	113
Saxonite powder	297	Silver Dollar	155
Sayyca creek	70	Silver Hoard Mining Co.	147
Scud river	67, 71	Silver King	152
Scaton creek	149	Silver King Co.	153
Second Relief	156	Silver Lead	155
Sentinel group	197	Silver-lead ores, reference to	24
Seven-mile	151	Silver Pick	113
Seven-mile creek	53	Silverplate	180
70-Mile House	118	Silver Ridge	149
Sewer-pipe	199	Silver Standard	112, 116
Seymour arm	184	Silverton	148
Seymour creek	200	Silverton Mines, Ltd.	149

	PAGE.		PAGE.
SIMILKAMEEN MINING DIVISION :			
Report of Mining Recorder	190	Spanish creek	53
Notes by Provincial Mineralogist	189	Spatsizi river	83, 86
Similkameen river, placer	183, 289	Spatum	185
Siwash creek	186	Split Volatile Ratio, reference to Peace River coal	134
Siwash Creek Mines, Ltd.	186	Spuzzum creek	187
Sixteen-mile creek	182	S. S. White Dental Co., assays Nelson platinum	159
Skagit river, report of Chas. Camsell	187	Stamp-mill at Hedley	23
SKEENA MINING DIVISION :			
Report of Gold Commissioner	99	<i>Poorman</i>	23
Report of Provincial Assayer	100	<i>Engineer</i>	61
Skeena river, reference to coalfields on.....	26, 30, 65, 92, 98	<i>Coronation</i>	191
Reference to river	83, 94	<i>Standard</i> (Revelstoke)	144
Navigation	65	<i>Standard</i> (Slocan)	148
Skidegate inlet	109	Zinc from	25
Coal in	249	Statistical tables	17
Skineuttle inlet	110	Steamboat mountain	187
Slag-disposal at Granby	178	<i>Stemwinder</i>	137
SLOCAN CITY MINING DIVISION :			
Reference to silver output	24	Stewart (town)	106
Report of Mining Recorder	150	<i>Stewart Frac.</i>	161
SLOCAN DISTRICT :			
Statistics, minor reference	18	Stewart Mining and Development Co.	104
Silver production	24	STIKINE MINING DIVISION :	
Report of Inspectors	146, 235	Report of Gold Commissioner	63
SLOCAN MINING DIVISION			
148	Stikine river, gold on		
149	Minor references		
94	At Telegraph Creek		
99	Basalt cliffs (diagrams)		
104	Topography of		
113, 140	Geology of at Telegraph Creek		
140	Mineral claims		
169	Coal		
23	Navigation on		
52	Stouts gulch		
143	Strawberry island		
125	Sugar creek		
194	Sullivan		
53, 54	Report of Inspector		
58	Summit camp		
137	Summit creek		
237	Summit Creek Hydraulic Mining Co.		
196	Summit lake		
118	<i>Sunnyside No. 4</i>		
198	<i>Sunset</i>		
161	Squash Colliery		
119	Surf inlet, mines on		
50	Surf Inlet Gold Mines, Ltd., report by Provincial Assayer		
267	<i>Surprise</i> (Omineca)		
150	" (Slocan)		
57	Surprise lake		
57	Susut river, coal		
83, 119	Swanson bay		
	<i>Swede</i>		
	<i>Syontl</i>		

T.

Table mountain	92	Telegraph Creek (town) 29, 30, 64, 68, 71, 80, 87
Table of production	13	Route to Groundhog coal
Tacoma, shipments to smelter	104	Geology at
Tacoma Steel Co.	239	Report of new strike near
Tahltan	71	Telegraph trail
Tahltan river	71, 76	Telfer creek
Illustration of cliffs	73	Telkwa
Taku arm	60	Tenas creek
<i>Tangent</i>	194	Ten-mile creek
Tanzilla river	75, 77	Teslin lake, reported gold strike
Tasu harbour	110	Testing of explosives and detonating-caps, methods employed
<i>Tecta River</i>	196	209
Teeta River Mining Co.	196	

	PAGE.		PAGE.
Tete Jaune Cache, notes on mica by H. Carmichael	52	Trail creek (Spatsizi river)	85, 86
Texada island, lime-kilns	28	" (Courier creek)	88, 90, 92
Iron	26, 197	TRAIL CREEK MINING DIVISION:	
Minor reference	197, 238	Report of Gold Commissioner	161
Thibert creek	29, 70, 71	Transportation best in winter in Atlin	60
Reference to old channel	77	<i>Treadwell</i>	161
Gold in 1873	69	Trout creek (Atlin)	60
Visit of Provincial Mineralogist	77, 78	" (Cassiar)	70
Platinum	63, 78	" (Trout lake)	151
Thibert Creek Mining Co. (now Boulder Creek Mining Co.)	77	Trout lake	151
Thompson creek	140	TROUT LAKE MINING DIVISION:	
Thompson river, gypsum	185	Report of Mining Recorder	151
Three Forks	146	Reference to silver	24
<i>Tiger</i>	146	Tsertia creek	84
Tiles	9, 27	Tulameen river	22, 190, 293
Timber, Klappan river	83	Reference to coal-mine	289
Peace river	135	Tuya river	75, 76
Stikine river	72	Geology	72
Tod inlet	28	Coal on	75
Cement at	198	Twelve-mile (Portland Canal)	106
Tofino	194	Twenty-mile creek (Quesnel river)	54
Tooya (<i>see</i> Tuya).		" (Peace river)	127
Trail	113	Two-mile creek	112
Shipments to smelter	140	Tye Copper Co., minor reference	61
		Tye smelter	198
		U.	
United Empire Coal Co., reference to output	20, 249, 291	U.S. Bureau of Mines	206
Union bay	271	Ure river (same as Liard river)	69
		<i>Utica</i>	148
		V.	
Vananda	238	Venture Company	50
<i>Vancouver</i>	155	<i>Venus</i>	153
Vancouver, reference to brickyards in vicinity of	27	Vermilion Forks Mining and Development Co., changed to Princeton Coal and Land Co.	289
Gravel and granite quarries	28	VERNON MINING DIVISION:	
Minor reference	54	Report of Gold Commissioner	183
VANCOUVER MINING DIVISION:		<i>Victor</i>	107
Report of Gold Commissioner	200	Victoria, minor reference	52
Vancouver Island	61, 193	Lime-kilns	28
Pottery-clay	27	Cement-works	198
Magnetite	26	VICTORIA DISTRICT	198
Coal statistics	247	VICTORIA MINING DIVISION:	
Coalfield	243	Report of Gold Commissioner	198
Vancouver-Nanaimo Coal Mining Co.	20	Victoria West, pottery-works at	27
New East Wellington Colliery, report of Inspector	269, 270	<i>Victory</i>	115
Vancouver Portland Cement Co.	28, 198	<i>Virginia</i>	161
Vancouver-Victoria Lime and Brick Co.	199	<i>Voigt</i>	189, 190
<i>Van-Roi</i>	25	Voigt camp	166, 189
Zinc from	149	Volcanic ash-beds, Stikine river	81
Van Winkle (old town)	50	W.	
		Wagon road, Telegraph Creek to Dease lake ..	64
		Dawson's description	76
		Glenora to Telegraph Creek	68
		<i>Walter</i>	194
		Wardle creek	187
		<i>War Eagle</i> (Portland Canal)	109
		" (Trail creek)	161
		<i>Washington</i>	165
		Washington State, ore shipped from	163
		Water for hydrauliclicking	55
		Scarcity of, in Atlin	49
		<i>Waterloo</i>	108
		Water Tight Dipper Dredge and Mining Co. ..	53
		<i>Waverly</i>	51
		<i>Wayside</i>	191
		Wellington camp	163
		Wellington Collieries Co., report of Inspector ..	271
		West Canadian Deep Leads	50
		Western Development Co.	88, 93, 116
		Western Fuel Co.	20, 252
		Douglas mine	257
		Esplanade shaft	253
		Northfield	256
		Protection	254

	PAGE.		PAGE.
Western Fuel Co., Reserve mine	258	WINDERMERE MINING DIVISION:	
Rescue-station	207	Report of Gold Commissioner	141
<i>White Horse</i>	63	<i>Windfall</i>	180
White Moose mountain	61	Wingdam	50
White Pass and Yukon Railway, freight rates on	56, 61	Wintemute, Irving, report as Gold Com- missioner	199
<i>White Swan</i>	115	<i>Wire Gold</i>	105
White Swan creek	60	<i>Wireless No. 1</i>	191
White water	146, 148	" <i>No. 2</i>	191
<i>Whitewater Deep</i>	148	Wolf safety-lamps	298
<i>Wilcor</i>	154	Woodbury creek	147
Wild Horse creek	154	Wormwold Creek Mining Co.	59
Williams creek	49	Wrangeli, Alaska, minor references 29, 65, 68,	77
Willow river	119	Wright creek	58
Wilson creek	59, 60	<i>Wyoming</i>	49
<i>Winchester Fraction</i>	180		
		Y.	
Yakoun river, coal on	111	<i>Yellowstone</i>	106
YALE DISTRICT:		Ymir	154
Reports of Gold Commissioners	184	YMR DISTRICT:	
Yale-Kamloops, copper production	25	Inspector's report	236
YALE MINING DIVISION:		<i>Ymir Mint</i>	154
Report of Mining Recorder	186	<i>Young Sport, No. 1</i>	196
Quartz-mining	187	" <i>No. 3</i>	196
<i>Yankee Girl</i> (Nelson)	152, 154	" <i>No. 4</i>	196
<i>Yanks</i>	54	Yukon river, minor reference to	64
Yellow creek	143		
		Z.	
Zinc, minor reference	18	Zinc, Omineca	113, 117
Reference to processes for separation.....	25	Slocan	149
Valuation of production	25	<i>Standard</i>	25
Lynn creek	201	<i>Van-Roi</i>	25
<i>Lucky Jim</i>	25	Experiments in Government office	31
<i>Monarch</i>	139	Zinc-smelter at Bartlettville	140
Morice	115	Zymoetz river, coal on	115
Nelson	155		

LIST OF ILLUSTRATIONS.

Spatsizi River, looking East, and Pass to Skeena River	Frontispiece.
Buckley Lake—Stikine Mining Division	Facing p. 144
Cement-works under Construction at East Princeton .....	.. 24
Dease Creek—Ryan's Mine .....	.. 80
Dease Lake—looking North from Head of Lake .....	.. 144
Diamond Vale Collieries—Plan of Workings	Page 234
No. 3 Slope and Tipple	Facing p. 216
Fan as thrown by Explosion .....	.. 216
Fraser River—at "53 Mile" on Grand Trunk Pacific .....	.. 48
Glenora—Abandoned Town of .....	.. 56
Grand Trunk Pacific Railway—at "53 Mile" .....	.. 48
Groundhog Coalfield—showing Contortions of Strata .....	.. 96
Showing bending of Measures .....	.. 96
McEvoy Flats Camp .....	.. 112
Groundhog Mountain Pass—in Midsummer .....	.. 112
Klappan River, Little—Indian Graveyard at .....	.. 160
Looking towards Mouth .....	.. 160
Looking towards Graveyard Camp .....	.. 160
Klappan River—above the Ford .....	.. 160
Klastine River—fording of the .....	.. 152
Kuldo—Totem at Old Kuldo, Skeena River .....	.. 192
Laketon—on Dease Lake .....	.. 86
Map—Liard, Skeena, and Stikine Mining Divisions .....	.. 208
Middlesboro Colliery—Nicola Valley—Rescue Squad .....	.. 272
Mt. Carbon Colliery—Columbia Coal and Coke Co. ....	.. 288
Pacific Coast Coal Mines—Rescue Squad .....	.. 272
Peace River Coalfield—Map of Coalfields	Insert p. 128
Sketch-map of Properties	Page 126
Section of Coal-measures .....	.. 128
Section on Johnston Creek .....	.. 131
Section on Moose Bar Creek .....	.. 131
Section on Gething Creek .....	.. 134
Coal-measures in Canyon	Facing p. 120
Seam J 16, Johnson Creek .....	.. 136
Seam J 14, Johnson Creek .....	.. 136
Measures on Johnson Creek .....	.. 124
Portland Cement and Construction Co.—Saanich Arm .....	.. 24
Princess Royal Island—Surf Inlet .....	.. 104
Surf Inlet Gold Mines, Ltd. ....	.. 104
Princeton Colliery—Headworks and Tipple .....	.. 288
Prospector packing Supplies on Dogs .....	.. 152
Skeena River—4th Cabin on Telegraph Trail .....	.. 176
Old Kuldo—Canyon at .....	.. 192
Coal Formation in Mountains .....	.. 88
Spatsizi River—near Source—looking North .....	.. 88
Stikine River at Junction of Tahltan .....	.. 72
Basalt Cliff at Tahltan .....	.. 73
Swimming Horses at Telegraph Creek .....	.. 72
Surf Inlet G.M. Co.—Sketch-map of Properties	Page 101
Table of Mineral Production	Facing p. 31
Telegraph Creek—Town of .....	.. 56
Thibert Creek—Boulder Creek Mining Co. Camp .....	.. 61
Boulder Creek Mining Co.—opening of Hydraulic Pit 61
Berry Creek Mining Co.—Works 76

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